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THE VIVISECTION QUESTION

POPULARLY DISCUSSED

BY

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TRANSLATOR'S PREFACE.

> "I am fully convinced that Physiology can progress only by the aid of experiments on living animals. I cannot think of any one step which has been made in Physiology without that aid. No doubt, many surmises with regard to the circulation of the blood could be formed from the position of the valves in the veins, and so forth; but certainty such as is required for the progress of any science can be arrived at in the case of Physiology only by means of experiments on living animals."—DARWIN.

IN publishing this translation of Dr Hermann's pamphlet,* I have to state that I do so only with his leave, and not at his request; so that he is in no wise to be held responsible for any seeming harshness in such diffusion of his criticisms beyond the circle they were written for. Also to explain that of the notes here given only those not enclosed within brackets are contained in the original; all so enclosed being merely additions made by myself. Of such other liberties as I have taken with the original, I can say that I have been careful to limit myself to what I had good reason for believing would meet with the author's approval.

As to the uses of the publication, I hope it may not only promote more intelligent, and therefore at once more judicious and more humane treatment of the animal world, but also help to show how undesirable it is, both for medical men and for the general public, that the vivisection question should be left in its present position. For though it is true that the ignorant assailants of Science are very far from having obtained their wishes, it is unfortunately also true that the Medical Profession, by letting itself be menaced into the acceptance of a vexatious and insulting piece of exceptional legislation, has, on the one hand, improperly assented to interference with its discharge of the duty of increasing its knowledge, and, on the other hand, lowered itself in the eyes of the public, and thus endangered the self-respect and conscientiousness that must ever be infinitely better securities for the discharge of *all* its duties, as well to animals as to man, than can possibly be given by any legislation whatever. That simple repeal of the new law would be far the best solution of the question, I see no reason for doubting ; but I fear that the confession of error involved in such an act of justice demands greater enlightenment and moral courage than any English Parliament of the present day is at all likely to possess. *Failing* this "best" solution, the complicated and degrading system of certificates and licences, which presumes guilt instead of requiring proof of it, may be replaced by a comprehensive measure regulating the treatment of all animals by all classes of the community, presuming innocence till guilt is proved, and affecting medical men only as it affects the other classes, namely, by requiring that no pain shall be inflicted without a legally sufficient reason.

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* *Die Vivisectionsfrage für das grössere Publicum beleuchtet.*

In conclusion, I would insist that justification of scientific vivisection is quite compatible with the amplest admission of the claims of the animal world on our sympathy; inasmuch as it depends not on want of proper sensibility to animal suffering, but on proper recognition of the evils of human ignorance and of the value of human life. As to the value of human life, there seems to be a pretty general, though unintelligent agreement. As to the evils of human ignorance, however, there is, at least in this country, a conspicuous want of agreement. But how can man make the noblest use of his life without the fullest knowledge of the conditions of that life? And is not every part of every science nothing but a part of such knowledge? Before we can take a right view of any question relating to Science, we must recognise that she must be pursued not merely where we see a prospect of some special application of knowledge, but even where we have nothing to encourage us but general faith in the elevating power of all knowledge. Just as we allow all conscientious use of means of satisfying our "material" wants, so we must allow all conscientious use of means of advancing Science. And so long as we can conscientiously inflict the pains of death for the sake of our nourishment, so long, surely, can we conscientiously inflict the pains, or no pains, of vivisection for the sake of our knowledge.

A. D.

11 ROYAL CIRCUS, EDINBURGH,
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THE VIVISECTION QUESTION.

ON the 11th of August 1876, one of the strangest Bills ever framed passed the third reading in the English House of Commons, and thereby became law.[1] Henceforth, on the other side of the Channel, whoever wishes to make scientific experiments on living animals must first look in a statute whether he is personally qualified to make them, whether the kind of animal to be used is a lawful one, whether the place where he wishes to make them is one where they may legally be made, whether their object is a proper one, and whether the intended mode of procedure is not a forbidden one. From insignificant and anything but serious-looking beginnings in Florence, an agitation against vivisection has passed over to England, and has there found such an extraordinarily favourable soil that it has very soon celebrated a complete triumph over Science. Emboldened by this success, it will also seek to carry legislative measures in the Continental States; and in Germany and Switzerland preparations for the attempt have already been made.

Science would be ill-advised, if she contemptuously ignored the danger threatening her, and, as has happened in England, raised her voice only at the last moment, when it was already too late. The feelings appealed to by the agitators are so easily excited in every breast, and the subject is so well suited for careless or intentional diffusion of false or exaggerated statements, that unaided truth would have no chance of success. Hardly *one* of the agitators, much less the multitude, has ever seen a physiological experiment; and only a very few of them have even, by reading physiological works, sought to get a true notion of one. Much in the same way as a child weeps over misfortune in a fairy tale, people that a moment before had no idea of the existence of a science called Physiology are suddenly moved to grief and indignation at supposititious atrocities said to be daily perpetrated in institutions supported by the State, by persons paid by it. It is often sufficient that these tales should be founded on the mischievous fun of a student or laboratory servant; and in a moment not only men conscious of beneficently co-operating for the great object of the advancement of human knowledge, but even the science that the healing art is chiefly founded on, and that every individual is under a thousand obligations to, is put into the dock, and charged with treading under foot one of the noblest feelings of man, namely, pity for the helpless.

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[1] [Eleventh of August was really only the date of the last opposition. Formal third reading did not take place till 12th August. Lords Agreement to Commons Amendments, 14th August. Royal Assent, 15th August.]

Science must speak, and she can do so with a good conscience. For to *her*, the question now brought before the public is no new one. Not only has her right to use the animal world for research for centuries been firmly based on serious consideration, but the investigator daily, before every experiment, goes through this consideration again. Above all, however, she has a right to demand from the legislator that, before anything is done, she shall be interrogated as an expert.

"But," it might be said, "the expert is here in an eminent degree an interested party." If this is true—and we have no wish to dispute the point,—then let more weight be given to her statements of fact than to her wishes. But to refuse to hear the only expert, because she is an interested party, would be to ensure the return of a verdict that might, indeed, be impartial, but would certainly also be erroneous.

I am far from pretending to the right of speaking in the name of a science; it is external circumstances that have compelled me to go particularly into the subject. The courage to come before the general public with an exposition of it proceeds from my consciousness of being still, as a professed physiologist, just as unprejudiced with regard to it as I was when, many years ago, I first approached it as a pupil. My abhorrence of brutal violence towards sensitive beings, as well as of wanton playing with them, is, I believe, as intense as that of anyone; and I can scarcely even be charged with being hardened[1] to the sufferings of animals, inasmuch as my labours are mostly confined to departments of physiology where no operations on living animals are required.

Physiology, or the science of the phenomena of life in plants and animals, can, of course, be founded only on the study of *living* organisms. In the explanatory natural sciences, however, simple observation, even when sharpened by artificial aids to sensorial perception, very seldom leads to exhaustive knowledge. Of her own accord, Nature reveals but little; but whoever understands how to question her by such artificial arrangement of conditions that what is observed must contain the answer is sure of penetrating into her secrets. This second and more fruitful means of research, namely, Experiment, is an essential condition of the advance of Physics, Chemistry, and Physiology. To Astronomy alone is it denied, in consequence of the enormous distance and mass of her objects, which forbid all human interference, and accordingly oblige her to content herself with the *opportunities* afforded by Nature for the answering of questions, that is, for observation, and to wait a century for her transit of Venus.

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[1] [Dr. Humphry, Professor of Anatomy in the University of Cambridge, speaking of vivisection, says:—"So far as I know, the experimenters do not become hardened by it. I may mention, for my own part, that I was very fond of shooting; and one of the things which ultimately led to my giving it up altogether was the pain consequent on it to animals, the lingering suffering of the animals after they were wounded."—*Vivisection Blue Book*, p. 32, question 622.

And Sir William Jenner, speaking of the late Dr. Parkes, Professor of Military Hygiene at Netley, an unhesitating supporter of the right of science to the use of vivisection, says:—"He was the kindest-hearted, the gentlest, the most humane man I ever knew."—*British Medical Journal*, 8th July 1876.]

It is not every physiological experiment that necessitates interference with life; indeed many experiments are performed on the dead subject, instead of on the living one. Research may be permitted this alleviation of her labours wherever death does not alter the properties of the object to be examined. It is true that such non-alteration can never be assumed with absolute certainty; but even where it holds good only approximatively, Physiology seeks to avoid vivisection, though the avoidance is not always to her advantage.[1] The purely mechanical properties of the body—such as the rigidity of the osseous framework, the elasticity of the walls of the vessels, and the extensibility of the muscles,—as well as the chemical composition of the juices and tissues, are all, on the assumption of such non-alteration, for the most part examined on dead material. Nevertheless, even Physiological Mechanics and Chemistry can in no wise entirely dispense with vivisection. Both mechanical and chemical properties are variously altered by death, as well as, during life, by the influence of the nervous system; and many animal juices not accumulated in the dead body can be got in sufficient quantity only by operation on the living subject.

For one notable saving in the matter of vivisection, science is indebted to the remarkable peculiarity of cold-blooded animals that their various organs *survive*, as it were, the death of the organism taken as a whole. On these organs—on the excised muscles and nerves of frogs just killed,—have been obtained the most important results of general physiology.

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[1] In many cases where results got on dead material used to be looked on as applicable to the living subject, more recent physiology has pointed out mistakes. Jealous caution as to such results is just one of the most marked features of modern research.

Even experiment on the living subject does not always involve injury. Experiments are performed even on man. Almost the whole of the physiology of the organs of sense is constructed from experiments where the experimenter, in accordance with a predetermined plan, presents phenomena to his own eye and ear.[1] Our muscular force, and the velocity of the processes in our nerves, we measure on ourselves.

At the same time, it is true that a great number of problems require more or less injury. In many cases, even simple observation can be practised only after concealed organs are made accessible to the eye by means of operation. But far more is revealed by well-devised interference with the machinery of the organism. It is often supposed that anatomical knowledge—post-mortem dissection—must suffice for the recognition of the functions of organs. The history of science, however, shows that this is by no means the case, even where such recognition now seems to us as simple as Columbus's egg. If we read the anatomical description of the vascular system, it seems strange that the purpose of this tube-work should not at once have been recognised; but we forget that the modern anatomical description assumes previous knowledge of the function, and thereby acquires an intelligibility by no means inherent in the structures themselves. In fact, the acutest men, with the most accurate knowledge of anatomy, for centuries laboured under the grossest mistakes as to the function; and Experiment—Vivisection,—in the hands of a man of genius, like Harvey, was necessary for the revelation of the secret of the circulation of the blood. The function of the nerves, in virtue of which they communicate, like telegraph wires, between different organs—carrying to the muscles the commands of the brain, and to the brain the messages of the senses,—could not possibly be so much as dreamt of, far less proved, till people began to cut through and stimulate the nerves of living animals and watch the results. Till half a century ago, nothing was known about telegraph wires; so that even the analogy with them, superficial as it is, could not contribute to the comprehension of the matter.

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[1] Even these experiments, however, have involved sacrifice. Several investigators, in their optical researches, have nearly blinded themselves.

If it is true even of the fundamental facts of modern physiology that they can be recognised only by vivisection, how much more is it not of the numberless more minute details? In no part of the organism does a single discovery exhaust the subject. It is rarely easy to understand and express the functions of the individual constituents as one does in the case of a machine made by the human hand. And infinite as is the delicacy of the animal tissues in comparison with the works of even the most delicate machinery, the complexity of the interweaving of the functions of these tissues is immeasurably greater. Though the fundamental facts of the circulation have been known for two centuries and a half, people are still, in almost all physiological laboratories, unceasingly at work on the further examination of the mechanism, and of the influence of the nervous system on the maintenance and regulation of this wonderful arrangement. Without numerous vivisections, indeed, this influence would never have been noticed at all, to say nothing of understood. Our knowledge of it is the fruit of unremitting labour in the way of vivisection for the last thirty years. We have only to follow these delicate researches in the physiological archives and at the same time look at their impress on the annals of pathology and therapeutics, in order to see not merely what trouble and expense in the way of experiments has been required for even the smallest step of progress, but also how every advance, however minute, in the comprehension of the subject leads to incalculable consequences in practical medicine. Let us take but a small department of the science of the circulation, namely, the researches on the sounds of the heart. The recognition of the diseases of the heart is essentially founded on interpretation of alterations of these sounds; and it is by means of vivisection that the accurate knowledge of the causes of the sounds that is necessary for such interpretation has to a large extent already been acquired.[1] That our knowledge of these causes is still incomplete is only in keeping with the fact that in questions of natural science generally a complete settlement is hardly conceivable.

But it would be a mistake to see in experiments on living animals an aid only to Physiology. Almost all branches of Medicine, besides continually building further on the results of Physiology, also avail themselves of such experiments directly, and do so with infinite advantage. How could the effects of poisons and drugs be investigated except on living animals? Or must we rather take man for the subject of experiment? In addition to Pathological Anatomy—that is, anatomical examination of diseased organs in the dead body,—there are no better means of acquiring a knowledge of morbid processes than artificial imitation of such processes on animals and analysis of its functional consequences. The results of this young branch of research—Experimental Pathology—are already of inestimable value. In the first place, experiment allows of a much more thorough investigation than is possible in the simple observation we are limited to in the human subject; and, in the second place, such observation is always defective, inasmuch as the beginning of the disease almost always escapes recognition and as the higher duty of therapeutic treatment directly interferes with observation of its natural course. Artificial communication of diseases to animals is, further, the most indispensable and sometimes the only means of deciding the pressing questions of infectiousness and of the nature of infecting substances. The remarkable alternation of generations of the intestinal worms, on whose recognition the subdual and avoidance of this plague and source of danger depend, could be established only by feeding animals with such worms and their germs—thus by poisoning animals, which the present agitation condemns as criminal. And even to Anatomy, Embryology, and Histology, experiment on living animals is an instrument that can no longer be dispensed with.

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[1] [Sir George Burrows, in his evidence before the Royal Commission, with reference to "experiments that were performed some thirty or forty years ago by Dr. Charles B. Williams and the late Dr. Hope, to determine the cause of the sounds of the heart and its motions," and were witnessed by himself, says:—"The motions of the heart were pretty well determined by Harvey in his experiments on living animals, but the causes of the sounds resulting from those motions, which since the use of the stethoscope we have been able to hear by applying it to the chests of living animals, were not known till those experiments were performed. It is very well known that on listening on the walls of the chest in a healthy person there are certain sounds; but the causes of those sounds were not understood before these experiments were made; and also it is known that on listening on the walls of the chest there are very strange modifications of these sounds when people are diseased; and the cause of the sounds was not understood. These experiments were performed on living animals. . . . The heart was exposed and its movements were seen; and by placing the stethoscope on different parts of the heart we were able to hear the sounds generated in particular parts of the heart; then further experiments were made . . . by introducing fine curved needles through the walls of the vessels and drawing back the valves, which immediately modified the sounds, and gave us sounds perfectly analogous to, if not the same as, the sounds often heard in the human frame when the heart and its valves are diseased; and from that time to this the diagnosis or distinguishing from the sounds of the heart the changes of structure which have gone forward in the valves has become a certainty; whereas before that it was confusion; and in that way great benefit arose to human beings in regard to the treatment of diseases of the heart, and the advice which can be given to them."—*Vivisection Blue Book,* p. 6, questions 132 and 133.]

To ask the use of vivisection to Physiology and Medicine is thus just about as senseless as to doubt the use of celestial observation to Astronomy, or of the study of records to History. The phenomena of life and disease can as little be examined on dead material as Astronomy can be cultivated in underground caves, or History on a Crusoe's island.

And yet there is actually some testimony against the scientific importance of vivisection, partly collected by the English Society for the Prevention of Cruelty to Animals, and partly given before the English Commission of Inquiry. It is true that the names of the witnesses are unknown to Science, and that their reasons are at most fitted for showing that there is nothing too perverse to find advocates even among persons bearing the title of doctor; and yet even such talk has been greedily quoted by the pharisaical haters of science. Thus a certain Mr. Maitland, quite lately (in the *Examiner* of 17th June 1876), says that those medical men that have had the courage to break through the trammels of professional interest have declared that not a single discovery of practical medical value has been made by vivisection that could not have been made by knowledge of anatomy and sufficient reflection! What a pity that science did not keep the discovery of the circulation, of the functions of the nerves, &c. for the genius of Messrs. Garth Wilkinson, Epps, Day, Bigelow, Cape, and Macilwain![1] Whilst some of these gentlemen deny all merit to research prosecuted by means of vivisection, others, more modestly, only hold that it has now ended its service, and is henceforth no longer needed. How remarkable! Thus, the very moment when the agitation takes notice of this method of research coincides with that of the completion of its task! Yesterday, it was still discovering important facts; to-morrow there will no longer be any prospect of its doing so!

Now and then, one hears of expressions against the value of vivisection that are said to have been used by distinguished representatives of Physiology herself. Authentic accounts of such expressions are nowhere to be found ; but it may be that investigators occupied in quite different departments of the science have occasionally dropped a slighting word about the certainly less inviting department concerned with vivisection. It must not be forgotten how vast the domain of Physiology is, nor how fundamentally different the laboratories of different physiologists appear. Here, in a physical laboratory, we have the most delicate optical, acoustic, and electrical experiments; there, we have a chemical laboratory, where animal substances are analyzed, where the balance of chemical change in the animal body is struck, and where the magnitudes of respirations are determined ; and lastly, in a third laboratory, we have those studies relative to the circulation, the laws of secretion, and the machinery of innervation that cannot be prosecuted without vivisection. With such diversity in the kinds of work, it is but human, if some day the representative of one department feels estranged from another department, and in an unguarded moment expresses himself sneeringly with reference to it ; much as a chemist might, in a petulant mood, do with reference to the work of the philologist, or *vice versa.* But all such expressions are next moment repented of by the true investigator, and will never be heard from him as deliberate assertions. The chemical and purely physical departments of Physiology are just as often sneered at as the department concerned with vivisection; and yet no one can even for a moment wish either of them less cultivated than heretofore.

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[1] See "Vivisection. The Royal Society for the Prevention of Cruelty to Animals and the Royal Commission." An octavo volume of lvi and 224 pages. London: Smith, Elder & Co., 1876.

The division referred to (pp. 122-150) is called "Opinions more or less against Vivisections," and is part of what was laid before the Royal Commission. The collection is, however, a rather unintelligent one. Thus, impugnments of the probativeness of experiments of an opponent, taken out of a scientific controversy, figure as testimony against vivisection generally. Most of the passages adduced are directed not against the *utility* of vivisection, but against its *lawfulness*, and especially against its employment for purposes of instruction.

For the statements against the utility of vivisection that are here referred to, see Nos. 169, 180, 182, 186, and 192 on pp. 123-139 of the book just mentioned. Also pp. 95-98 of the Blue Book to be afterwards mentioned.

On the other hand, with more excuse, at any rate, than in the case of the *utility* of vivisection, people have questioned its *justifiability.*

Many are offended at Science for claiming the right to kill animals for her own purposes. "Thou shalt not kill," says, point-blank, a pamphlet lately sent to the physiological laboratories. And it may be admitted that whoever leads a strictly vegetarian life has purchased a certain right to forbid the killing of animals at all.[1] Moreover, even people that hold the use of animal food to be indispensable might say:—"Though man is entitled to kill animals for his necessities, yet every sacrifice of animal life beyond these necessities is unwarrantable; and science is a luxury."[2]

It is, however, not difficult to refute this argumentation, even without losing a word over the last proposition. Even the most zealous protector of animals has the words "useful and noxious animals" constantly in his mouth; and thereby testifies how thoroughly he has digested the idea of the complete subordination of the animal kingdom to the interests of man. He deems it right, not only that many thousands of animals of all kinds are daily annihilated for the nourishment of man, but also—and here even the vegetarians form no exception—that everything that comes into conflict with his convenience or health, or with the prosperity of his fields, gardens, or vineyards, is mercilessly destroyed. He approves of strict regulations for the extermination of locusts and cockchafers, sets traps and spreads poison for mice and rats, proscribes the flies that disturb his sleep, and drowns the cat's litter when the increase seems too great for his household. And along with the motives of all these things—motives that are far from having the same immediate importance for life and health as the expulsion of intestinal worms, or the destruction of body vermin,—should not also the interests of Science, to say nothing of her utility to Medicine, and accordingly to Man, be made the foundation of a claim for the sacrifice of some animals? On people that make the *preservation* of animals a principle, the most insignificant animal structure—the infusorian in the drop of water—has the very same claim to be spared as those animals they have arbitrarily marked down in their list of subjects for protection. For to *life* every creature has an equal right: here there are no higher and lower ranks. Indeed, even the pulling of a flower ought, to such minds, to seem a crime. Whoever on the principle of not destroying any living being is a vegetarian ought, on the very same principle, to starve altogether; inasmuch as even the fruit of the plant still shelters a life,—that of the embryo,—which shews itself when the grain is buried in the earth. Thus, even the strictest vegetarianism commits robbery on living beings. To such robbery, both animals and man are driven by an inexorable law of nature; and from a higher point of view it is of no consequence whether it is committed on plants or on animals. Only those animals that live on carrion lead a truly blameless, plant-like life (though even among plants there are insectivorous species!). All others take away life, in order to prolong their own life.

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[1] [Even ordinary use of milk and eggs must, however, be abstained from; inasmuch as such use involves destruction of surplus stock (especially, of course, of surplus males).]

[2] [This seems to be the view of Miss Frances Power Cobbe. For, while stating in one of her writings ("The Moral Aspects of Vivisection") that "the cattle we use for food exist on the condition that we shall take their lives when we need them," in another ("Mr Lowe and the Vivisection Act," in *Contemporary Review* of Feb. 1877) she says:—"*Whatever* be the value of that scientific discovery which must be obtained by *torture*, it is morally forbidden to us, just as if it were to be gained by robbery, rapine, perfidy, or any other crime between man and man." Surely it were well if this author, instead of simply assuming a monopoly of morality, made some attempt, in the first place, to ascertain whether animal food (or produce) is really more necessary than science, and, in the second place, to compare the *constant* infliction of "torture" by slaughter (without anæsthesia) with its *occasional* infliction by vivisection.]

"But," say many, "though the *killing* of animals in the interests of man is lawful even beyond his absolute necessities, it is yet unlawful, for any purpose, to inflict torture on animals *beyond what is involved in killing them at once*, that is, to perform vivisections."

To this, it may be answered that if the existence of this great gulf between lawful killing and unlawful interference of another kind is actually susceptible of strict logical or moral proof, it is surely strange that the protectors of animals do not first turn their attention to practices *on a scale a thousand times greater than that of all the offences* *of vivisection.* Especially, why do they not first raise their voices against the fact that animals are mutilated in enormous numbers for mere cattle-breeder's purposes, or even for mere fancy? From the point of view of this morality, can the castration of horses, cattle, sheep, and pigs be justified? And in comparison with the mass of pain and misery here inflicted solely for the sake of gain, is not the scientific torture of animals positively insignificant? Even the Societies for the Prevention of Cruelty to Animals will be astonished at the following numbers, which, at my request, Professor Kramer of Zürich has calculated from the results of the German cattle-census of 1873, and which he has kindly placed at my disposal (for the calculation itself, see the appendix[1]). In the German empire, there are every year castrated: 65,000 horses, 650,000 cattle, 2,000,000 lambs and sheep, 8,000,000 pigs,[2] and innumerable fowls!

And what are the purposes of this operation? Stallions are castrated to make them quieter and more manageable; the other animals to improve the yield and quality of the flesh or to improve the wool. Is it possible to conceive of more mercenary reasons for the justification of one of the most barbarous and revolting of animal tortures? For the operation is always performed without anæsthesia, often by persons quite unskilled, and hardly ever by scientifically educated ones.

Another bucolic vivisection is docking of the tail, which in the case of sheep is almost universal. It is also often practised on dogs, mostly along with cropping of the ears; and England is the native country of that barbarous mutilation of the tails of horses that we call anglicizing.

For the assignment of the purpose of the docking of the tail in sheep, I am so much at a loss that I must have recourse to a note.[1] In horses and dogs, the reason is pure *fancy*—improvement of nature according to the taste of certain people!

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[1] [The appendix is omitted from this translation, as it seems unlikely that any one will question the substantial accuracy of the numbers given in the text.]

[2] [Spayed females included.]

Further, what abundance of material for indictment a protector of animals would find in the theatres of the sports tolerated by the State—in the race-courses, hunting-fields, pigeon-shooting places, &c.!

And besides mercenary motives and love of amusement, we have also thoughtlessness and ignorance, to the endless multiplication of vivisection-like animal tortures. Millions of frogs, brought for food to the market, are simply cut through the middle; the anterior half of the animal being just thrown away. And this half-animal lives on for days![2] The empaling-boxes of our butterfly-collecting youth are veritable torture-chambers. Moreover, nobody ever heard of the zealous anti-vivisectionists in oyster-producing England having their oysters boiled to death before being opened. The animals come to table literally vivisected.

Indeed, even the zoological gardens expressly patronised by the Societies for the Prevention of Cruelty to Animals are not innocent of animal torture; and their object is at any rate far more amusement than instruction. Even the deprivation of freedom is for many animals a

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[1] [Whoever wishes to see the foolish reasons given by the farmers is referred to the original of this translation. Here, all that need be given of the note is the statement that the wethers, which have already been castrated, are the only sheep that keep their tails, so that actually no member of the flock escapes mutilation in one form or another.]

[2] In contrast with the uncontrolled cruelties that, as is mentioned in the text, are perpetrated in the preparation of the frog legs brought to market, it deserves to be specially pointed out that in the manufacture of the frog nerve-muscle preparations physiologists are in the practice of thrusting a stilette into the spinal canal immediately after the first cut through the vertebral column, in order to destroy the spinal marrow and the brain. Far the greater number of the frogs used in physiological laboratories and lectures are treated in this way, that is, are not vivisected, but completely killed in the quickest way; after which their isolated organs are experimented on. Frogs are the very animals seldomest tortured in laboratories, and are infinitely oftener tortured outside them. On this point, as I have lately had opportunity of observing, the most erroneous opinions are prevalent.

"prolonged pain;" the unnatural climate for others. The monkeys die almost regularly of consumption—are thus, in fact, *made* ill;—whilst experiments on inoculation of the same disease are counted among the crimes of medical research.

And lastly, we must ask, is our century really so advanced as to shrink from effusion of blood for objects either actually ideal or supposed to be so? People may call it trivial, but it is nevertheless logical, to refer the denouncers of vivisection to what is deemed quite lawful against *man*, in war, and, according to many, also in duels. For the honour of one's country or person, one is allowed to threaten human life, and, indeed, even by the most elaborate means to destroy it. In the eyes of most people, the ideal end sanctifies the most horrible means; and among the admirers of battles are many that would forbid Science the sacrifice of a worm. It is useless for such people to try to get out of their dilemma by saying that the right of threatening human life is purchased by the danger of the combatant himself, and that his deeds are excused by passion. For the general whose deliberate order costs thousands their lives, and tens of thousands their happiness, must neither expose himself to danger nor allow himself to be actuated by passion; and the torpedo that annihilates hundreds at a blow is exploded from a distant and perfectly secure place by a man that, with his hand on the terrible telegraph-key, preserves the most absolute calmness, whilst he follows with his telescope the movements of the ship that is doomed to destruction. All this is allowed; and yet research must stop on account of the hysterical idiosyncrasy or the pharisaism of people that can look only at human blood, and not at animal blood, unless, indeed, it is shed to increase the production of wool, and not for the advancement of our knowledge.[1]

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[1] [Mr. James Maden Holt, M.P., a member of committee of the Society for the Abolition of Vivisection, in the principal clause of a bill prepared and, on 24th May 1876, brought into the House of Commons by himself and others, while proposing the total prohibition of vivisection for any physiological or medical purpose, commits himself to the approval of all other vivisection, pro-

For *the advancement of our knowledge*, and not practical utility to medicine, is the true and straightforward object of all vivisection. No true investigator in his researches thinks of the practical utilization; and it is just in the surrender of the animal world solely to the ultimate object of the alleviation of human suffering that it would be easiest to discover something mean and egotistical. Science can afford to despise *this* justification, with which vivisection has been defended in England. At the same time, it is doubtless the one that most universally impresses people. Even if the slaughter of animals for food and the other interferences

vided only it be unaccompanied by "*wanton*" cruelty or the infliction of "*unnecessary*" suffering.

The clause is titled: "Prohibition of vivisection. Wanton cruelty prohibited," and runs as follows:—

"*From and after the passing of this Act* it shall not be lawful to perform any experiment causing, or of a nature to cause, pain or disease in any animal, or to cut or wound any living animal, except as hereinafter provided; that is to say, for the purpose of—(1.) Killing any animal; or (2.) Alleviating or curing any disease from which such animal is suffering; or (3.) Performing any operation required to render such animal better suited for the service of man; or (4.) Ascertaining, in pursuance of a judicial inquiry, and by direction of the Secretary of State, and under such regulations as he may prescribe, the nature or operation of any supposed poison for which there is no known chemical test: and any person except as aforesaid taking part in any such act, or permitting such act to be performed upon any premises over which he has control, shall be deemed guilty of an offence against this Act. Provided always, that, notwithstanding anything herein-before contained, it shall be an offence against this Act for a person to treat any animal with wanton cruelty or to subject it to unnecessary suffering."

With regard to the Bill, Mr. Lyon Playfair, in the House of Commons, said:—"The thorough prohibition of scientific vivisection is aimed at the practices of about a dozen physiologists all through the Kingdom, although not one instance of cruelty has been established against them during the three years' agitation of the subject. And the same Bill throws a legal mantle of protection around the thousands of our countrymen who hunt, who slaughter, who maim animals either for pleasure or profit. I know that the honourable Gentleman thinks he has Scriptural warranty in the grant of animals to man for food; but it is difficult to include in such a warranty the hunting of foxes, or even ordinary sport. There is another Scriptural authority which tells us that we often strain at gnats and swallow camels; and the Bill, to my mind, rather illustrates that it

'Compounds the sins it is inclined to,
By damning those it has no mind to.'"

—*Hansard's Parliamentary Debates*, 9th August 1876.]

with the animal world that are dictated only by utility necessarily involved the most horrible degree of animal torture, yet man, as he is constituted, would nevertheless quite certainly not forego the very smallest of the advantages so to be purchased. Much less would anybody deem it unjustifiable to sacrifice a hecatomb of animals in order to save a single human life. In reality, however, it is, conversely, true that a single experiment may have the most beneficent consequences for many thousands of our race.

* * *

I hope no one will misunderstand my object in mentioning bucolic and similar inflictions of torture on animals. I have done so neither in order to justify little sins by the impunity with which great ones are committed nor in order to denounce particular misdeeds and procure the prosecution of the offenders.[1]

Every one will admit that the question of the justifiability of vivisection is not a moral one comparable, say, to that of the lawfulness of cheating or murder. It may be that in the mutual relations of human beings the moral laws are

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[1] [Sir William Gull, in his evidence before the Royal Commission, in answer to a question about proposals "to inflict restraints, or perhaps pains and penalties, on scientific men for doing certain things, while the other classes of the community, for totally different motives, and for what many will say are far less worthy motives, are doing precisely the same things without any legislative interference," says:—"Though I should decidedly think it would be very unequal legislation, and though I think that aspect of the case is one which the Commission and Parliament cannot leave out of consideration, I think that what is due to science and the position of science is much above requiring even the aid of what I should call such collateral help. That is the *tu quoque* argument. I agree to it quite, but I think that we can fairly justify our position, and more than justify it, upon its own merits."—*Vivisection Blue Book*, p. 267, q. 5495.

And in the debate on the second reading of the Government Bill in the House of Commons, Sir John Lubbock says:—"A good deal has been said with reference to the cruelty of sport. For my own part, however, I do not think there is much in the *tu quoque* argument. If cruelty there be in the one, it cannot be defended merely by showing that there is cruelty in the other also. . . . As far, indeed, as mere suffering is concerned, it cannot be denied that one day's battue will often inflict as much torture as all the physiological experiments of a year. It is not so much the animals which are killed as those which are wounded. Physiologists tell us of many cases in which hares, for instance, have been sent implanted in every breast; but it is not the same with our relations to animals. Where killing—thus, what in the case of human beings would be the greatest crime—is universally acknowledged to be lawful, it is impossible to hold that the limits of what is lawful are unmistakably marked out. Investigators have hitherto acted according to their own consciences; in such questions always the best, though no absolutely infallible guide. Suddenly, others come in, alleging that Science has been guilty of serious excesses, and claiming a right to dictatorial interference. To this, Science can oppose only the announcement of a clear programme that allows itself to be discussed and of a fixed principle. She will, however, readily enter on the discussion. Let people first have a clear notion of the bounds they would set to the utilization of the animal world, no matter whether these bounds are determined by the objects or by the magnitude of the sacrifice; but do not let them turn quite arbitrarily against one particular thing, letting alone a thousand other worse things that in any orderly procedure would have to be put down *before* vivisection. Either the things I have mentioned are overlooked or—people find it more convenient to take the field against fifty physiologists than to do so against a hundred thousand cattle-breeders.

Let us now consider somewhat more closely the cruelties that Science is said to be guilty of in vivisection.

to them suffering from painful diseases caused by a single shot corn having been lodged in the serous cavities, thus producing acute inflammation, lasting for weeks, during which, no doubt, the animal must have suffered extreme pain; nor will I enlarge on the dreadful sufferings of animals which are caught in traps, and which have often been known in their torment to gnaw off the limb by which they were held fast. Still, I trust I may be permitted to express a hope that one result of the strong sentiments which have grown up on this subject may be to alter the state of feeling in which men of high character, and, I do not doubt, really most kind-hearted, think it a legitimate subject of pride to boast of the greatest number of lives which they have been able to destroy in the course of a day's so-called sport; and we must remember that, while in the one case it is the death itself of these animals which is the object in view, the aim of physiologists is the relief of suffering."—*Hansard*, 9th August 1876.]

In the first place, it appears that the pain the animals have to bear is considerably overrated, even in the cases where, for some reason, no anæsthetic can be used. Have we, then, any means of estimating the degree of pain or distress an animal suffers in an operation?

The agitators are wont to suppose this question very easily answered. With the arbitrariness of ignorance, they simply judge of everything from the *human* point of view. In reality, however, though we have reason for attributing to all animals the sensations of pleasure and displeasure, and also for holding that the quality of the sensations of pain, light, and sound is the same in all of them, we are yet quite in the dark as to the intensity of these sensations.

But does not the frog, when we hurt him, show every sign of pain? Has not his writhing in order to get rid of the cord fastening him quite a human look? Certainly! But remove his brain, and thus radically annihilate his consciousness—his capability of sensation,—and he still makes the very same resistance to the restraint, which, however, is now absolutely painless. These defensive movements are mechanical reflex actions, arranged by nature for the protection of the animal against threatened injuries. We ourselves possess them; and they manifest themselves especially during sleep, when our consciousness is interrupted. They form the first stage of the reaction of the animal body; the resolution called forth by the pain the second. The first reaction is, as the result of machinery, the more limited, and may sometimes, in consequence of altered circumstances, become useless, or even injurious; just as the governor of a steam-engine, if its operation on the steam-pipe should once, in consequence of mal-position of the levers, become reversed, would have mercilessly to set the machine into quicker and quicker motion till it was smashed to pieces. Pain, however, is a bell-signal that in case of need calls, as it were, all hands on deck, in order that all the means at the disposal of the organism, and not merely the regular, mechanical ones, may, with proper attention to all the special circumstances of the case, be used for the avoidance of the danger.

Inasmuch, now, as we cannot in animals get any direct evidence as to the intensity of the sensation of pain, we can only, by a round-about way, reach an approximative conclusion. In nature, everything is arranged economically; and we may therefore suppose that the intensity of the sensation of pain always corresponds to the actions dependent on that sensation. These, however, are measured by the difference between the reaction of the conscious animal and the reaction of the animal entirely left to its machinery. Accordingly, we compare an uninjured animal's behaviour to painful impressions with that of an animal deprived of its brain. Then, it comes out very clearly that the difference in the reactions becomes less, the lower the creature stands in the scale of animals. In frogs, it is already very inconsiderable, provided we remove from the brain only the actually sensorial part, that is, the cerebral hemispheres. It may thus be assumed that the intensity of the sensation of pain diminishes as we descend in the scale of animals. Indeed, it may be doubted whether all animal organisms are endowed with the power of feeling pain. For there are animals in which the analogue of the brain is completely wanting—that thus presumably are mere reflex machines, and have therefore no need of pain—have no apparatus beyond what is mechanical, and accordingly require no signal to rouse them.

The protectors of animals will probably be dissatisfied with this strange-sounding physiological argument, especially as even our own statement of it admits it to have no claim to absolute certainty. There is, however, another consideration which will satisfy everybody, namely, a *psychological* one, which makes the pain of animals seem hardly comparable with that of man.

Every one, from his own experience, knows that the expectation of a pain, the thinking about its duration, and the anxiety for the future are more distressing than the pain itself. Moreover, it is clear that these psychological factors are incomparably weaker in animals than in man; and that, though perhaps still of some importance in the dog, they are already very feeble in the rabbit, and must be of vanishing minuteness in the frog. And the experience of vivisection confirms this. Animals that remember pain, and must therefore be credited with psychological factors in it, struggle against the ligatures more in the second operation than in the first. According to my experience, it is only in the mammalia that anything of this is to be observed. That I have found it more noticeable in rabbits than in dogs, which at first sight looks paradoxical —the intellectual powers of the rabbit are, like its cerebral development, far below those of the dog,—is perhaps simply explained by the circumstance that dogs can in general be better anæsthetized.

In the vast majority of vivisections, the animal is, by very efficient anæsthetics, wholly spared the pain. Of these anæsthetics, we have now a pretty good choice, corresponding to the various animals and to the various special objects of experiment. The production of anæsthesia, which is usually effected by injection of morphia into a vein (in skilful hands, the requisite little operation, which gives little pain, lasts hardly a minute), and in other cases is effected by the administration of chloral or the use of chloroform, is, as a rule, the first step in the physiological experiment. From the circumstance that in text-books and treatises this production of anæsthesia, being a matter of course, is not always specially mentioned, people have believed themselves entitled to infer that it is neglected. But even the representative of the English Society for the Prevention of Cruelty to Animals had, in the hearing before the Royal Commission, to allow that he did not know of a single case where the use of anæsthetics was possible and yet was omitted.[1] Even if the experimenter's humanity

[1] [Mr. Colam's words are: "I believe that generally the English physiologists have used anæsthetics where they think they can do so with safety to the xperiment."—*Vivisection Blue Book*, p. 78, question 1543.]

were very small, he would still use anæsthetics; as it is nearly always most directly for the interest of the experiment itself that he should do so. For all the more delicate operations, absolute stillness of the animal is indispensable; the animal being often in connection with the most delicate apparatus, so that a sudden movement would spoil the apparatus or break the connection. It is true that if stillness were all that was wanted, and the experimenter were cruel enough, it might, by the employment of the Indian arrow-poison (urari), which deprives the animal of the use of its muscles, be got without previous production of anæsthesia.[1] But the influence of pain on the pulse, respiration, temperature, and secretions is so disturbing, and affects experiments with such important sources of error, that the rule of the production of anæsthesia is become almost a law.

There are, indeed, exceptional cases, where anæsthetics are inadmissible. As anæsthetics induce a kind of poisoning, there are many toxicological cases where their employment would be a mistake, since it would condition a double poisoning that would complicate the experiment. Still, toxicological experiments are, on the whole, but seldom painful. Again, anæsthetics are inadmissible in many researches on the pulse, blood-pressure, and secretions, inasmuch as they themselves have a certain effect on these functions. Lastly, if any one wishes to study the physiological effects of pain, he must, of course, not remove it. But all these are comparatively rare things.

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[1] That such experiments (of course, other than toxicological experiments on urari) have been performed, is asserted on insufficient grounds. Without direct proof, I cannot believe that any physiologist has been unreflecting enough to look on urari paralysis as a substitute for anæsthesia. [There seems to be quite as much reason for supposing urari an anæsthetic as for supposing it not one; and accordingly it is not certainty of its not being one, but only uncertainty of its being one, that hinders physiologists from using it as such.—*Vivisection Blue Book*, p. 123, question 2323; pp. 332 and 333, questions 3719-3722 and 3758-3760; pp. 238 and 239, questions 4762-4782; pp. 285 and 288, questions 5694-5699 and 5791-5796.]

In the great majority of experiments, anæsthesia is actually produced.

One can hardly understand how the English agitation has extended even to experiments that are not vivisections at all—namely, to experiments on the action of drugs and poisons. It is intelligible that people should have such an antipathy to the mutilation of living animals for scientific purposes—to the actual *sectio vivi*—as even to dispute its utility; but it is difficult to imagine oneself in the position of those persons by whom even the experiments just mentioned have been condemned as useless and only leading to error.[1] These persons have been unable to give any other reason for their opinion than the circumstance that there is a material difference between the action of some substances on dogs and the action of the same substances on man. As though the knowledge of such differences of action were not just what most advanced our comprehension of the action of poisons, and as though the problems of natural science were to be limited by considerations respecting utility to man—to Medicine! And if we take up such an objectionable position, what follows, but that we must test drugs only on man himself, and accordingly now and then sacrifice a number of human beings, sound or sick, in order to spare animals?

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[1] [Mr. Lyon Playfair says :—"There are some persons . . . who honestly think that experiments on animals are unjustifiable at all times, and that they never produce benefit to man. . . . They assert that even the discovery of the use of chloroform was not derived through experiments on animals, but by direct experiments of Sir James Simpson on himself and his assistant. This may be so, for he was a bold experimentalist ; but I have often seen him try experiments for new anæsthetics on animals. Let me instance one of these. I drew his attention to a new ethereal liquid which I thought might have anæsthetic qualities. Sir James Simpson was so struck with it that he desired at once to try it in my laboratory. I, however, refused to supply him, unless he promised me to try it first on rabbits. On administering it to them, they quickly became insensible, and duly recovered. Next morning, Sir James Simpson was looking about to inhale it himself, but on looking into the rabbit-hutch he found all the animals dead. Now, the extreme anti-vivisectionists would think this an unjustifiable experiment. I do not."—*Hansard*, 9th Aug. 1876.]

Toxicological research, apart from its practical utility to Medicine, which is more patent than that of many other kinds of research, is one of the most efficient means of advancing Physiology. The physicist or chemist can hardly more certainly advance in the comprehension of phenomena than by the utmost possible variation of their conditions—that is, by observation of them at different temperatures, pressures, and so forth. So, too, with vital phenomena; it is just the reaction of the organism to very active substances introduced from without that teaches us the most secret properties of this wonderful machine. Of this side of the matter, these superficial critics have no idea. To them, toxicology is a mere testing of drugs and poisons on animals; the former for medical, the latter perhaps even for criminal purposes. In fact, an over-zealous tract some time ago sent from Munich to the physiological laboratories—namely, one translated from the English by Elpis Melena, and called "*Vivisection, Shakespeare und Sir Walter Scott*"—brings into the field against toxicological experiments the words with which, in "Cymbeline," the physician condemns the experiments of the poisoner queen:—

> "Your highness
> Shall from this practice but make hard your heart."

What complete misunderstanding, or what wilful misconstruction of the great poet: from the warning words of the physician, who sees through the nefarious designs of the queen, to extract a dictum against a particular kind of scientific experiment! Whoever expects with such a quotation to make any impression on investigators can have no idea of the seriousness of their subject. Fancy calling out to a physicist engaged in experiments on the velocity or path of projectiles:—"Stop; you are playing with things used for murder!"

Especial indignation seems to have been excited in England by experiments of protracted duration. The "evidence of prolonged pain" takes up a great deal of room in the writings and discussions on vivisection.[1] And yet the experiments where an animal after an operation is kept alive for a lengthened period, in order that the consequences of a functional disturbance may be observed, or that a secretion may be collected from a fistula artificially established, are usually just the least distressing ones.[2] The whole manufacture of the phrase "prolonged pain" is a denunciatory move. Perhaps a still more effective means of exasperating the reader would have been division of the experiments into quarter-hour, half-hour, hour, day, and week long; or into slightly painful, very painful, and unendurably painful. The measure of what is exacted of the animal experimented on depends not on the experimenter, but on the problem; and it has yet to be shown that this measure has been exceeded. Taking a very childish view of the nature of vivisection, as if operation on living animals were the end, and not merely a means to the most complicated further observations, the new English vivisection law requires that the animal shall be killed immediately on the conclusion of the experiment, and whilst still under anæsthesia. Just as if it were ordered that cattle whose flesh-production it is wished to improve by castration should be slaughtered immediately on the conclusion of the operation (with anæsthesia, we are here, of course, never concerned).

The agitators are nearly unanimous in unconditional condemnation of all vivisection for mere *purposes of instruction.* "Even if," say they, "the cruel means of research be indispensable for the progress of science, it must, and without injury to science or instruction can, be banished from the lecture-room." English voices are lifted up in indignation at the torture of numerous animals only to make lectures "more interesting." A Professor Nichol goes the length of a comparison with a lecture on the Inquisition where the lecturer, to please his audience, should actually cause some human beings to be tortured.[1] Others think the sight of tortured animals must harden the hearts of the students (perhaps it were well also to keep the students from the sight of sick people, and not to blunt their delicacy of feeling with the dissection of human corpses!). The Reverend Dr. Haughton says he is horrified at the idea of showing students vivisections, and thus "letting loose upon the world a set of young devils."[2] In these strange fears, I can see nothing but sad and ill-considered testimony to the nature of students on the other side of the Channel. If Dr. Haughton is right, the students of Trinity College, Dublin, must have a very strong propensity to cruelty; though perhaps they are distinguished in "muscular christianity." Whoever is acquainted with *our* students will be unable to conceive of their taking home from a lecture illustrated by vivisection anything but increased intelligence and increased respect for the seriousness of science.[3]

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[1] See *Vivisection*, pp. 57-95.

[2] As examples of more protracted experiments that are necessarily distressing, may be mentioned those on chemical change and on functional derangement in starving animals. In these, the investigator has to exercise most resolute self-control; but the results of such, fortunately very rare, experiments are of extraordinary importance.

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[1] See *Vivisection*, p. 135.

[2] See the Blue Book, to be afterwards mentioned, of the Royal Commission in England, p. 102, question 1888. [Dr. Haughton objects to *all* vivisection for instruction, whether performed under anæsthesia or not.—*Blue Book*, p. 101, question 1877.]

[3] [In Sir William Gull's evidence before the Royal Commission, we have the following. The questioner is Mr. Huxley.

Q. "As regards the increase of demonstrative teaching, to which (if I may say so) you justly attach so much importance, may I ask you, as having so much experience as a teacher, whether it is not your opinion that the spread of careful methodical instruction in laboratories is probably more calculated than anything else to diminish any tendency which may exist towards the wanton infliction of pain?"—*A.* "Certainly. I should like to add that ignorance is wanton and cruel, and not knowledge. They are opposed in this."—*Vivisection Blue Book*, p. 267, question 5498.

Also the following, which may be contrasted with Dr. Haughton's unworthy aspersions. The questioner is again Mr. Huxley.

Q. "From what you have told us, there are probably few persons who are more intimately acquainted with the medical students of London than yourself." *A.* "Perhaps very few. I lived fifteen years in Guy's Hospital with them, and I was occupied in all thirty years with them there."

Q. "A statement has been made publicly, which I will read to you directly, But even if there were among the students a few ill-disposed natures in whom concomitant bad moral effects were to be feared, it would still be quite impossible to banish experiments on living animals from physiological instruction without degrading it. At the primary school, indeed, such educational considerations are in place; but *academical* instruction unconditionally demands that nothing shall be wanting to give it its full effect. And as certainly as nobody will become a zoologist, botanist, or mineralogist without seeing and examining animals, plants, or rocks, so certainly can Physics, Chemistry, and Physiology not be taught with mere drawings or preparations. Here, experiment says everything, and with far greater truth and impressiveness than the most eloquent tongue. It has been said that the pupil must *believe* his teacher, without himself seeing. But experiment is not a mere *witness* for the teacher, but itself a second, far better teacher. And must the teacher himself again, on the same principle, have only believed his teacher, and not himself have re-examined? This would carry us back to the blind repetition of the middle ages. An experiment once made and acknowleged by the contemporaries of the experimenter would remain without re-performance, without improvement, and without discovery of sources of error. Every re-performance of an

that the English medical student is attracted by sights of suffering, and is likely to throng exhibitions of animal torture as he would throng no other exhibition. Is that in accordance with your experience of the English medical students?" —*A.* "I should say utterly contrary, and a very serious libel upon medical students."

Q. "The statement to which I refer is contained in a paper called 'The Moral Aspects of Vivisection,' written by Frances Power Cobbe, and the statement is this: After speaking about students trooping out to see an animal killed, it goes on to say, 'The same keenness of observation, or a memory of their own youthful insensibility, ought to teach all professors of physiology that they are indulging a maleficent tendency which already exists in their pupils' disposition, when they invite mere lads of the Bob Sawyer type to watch their frightful experiments, the more frightful, so much, alas! the more attractive.' In the whole course of your experience, have you ever seen anything which could cause even the remotest justification of that phraseology?"—*A.* "I have not."—*Blue Book*, pp. 267 and 268, questions 5500-5502.]

experiment, even when nothing else is intended, is an opportunity for new discovery. Ask the physicist or physiologist whether many of his most valuable ideas and discoveries have not come to him in the course of lecture experiments! The student that has never, by vivisection, looked into the innermost machinery of animal life will always remain a bungler in medicine. Facts will stick in his head as recollections of text-book pages, not as subjects of personal knowledge. Do not let this be made light of! In the after physician are seen all the faults of the education of the student. Whoever has not learnt to see for himself, to thread his way through the thousand difficulties in the way of personal acquisition of knowledge, and to make out for himself, in the dark cavity hardly accessible to the eye, the faint alteration produced by the stimulated nerve, to which his teacher directs his attention,—whoever is satisfied with the fact standing in the book, without an idea of the battle it has cost to discover it, or of the doubts left by the imperfection of the senses,—will also as physician care little for deeper penetration into the case before him—will, according to page so-and-so of the book, treat by pattern the disease he has barely recognised by pattern. At a vivisection during lecture, I can already, from the behaviour and countenances of the students, approximatively estimate their endowment for the function of the physician. I see some remaining unconcernedly in the background, and others pressing on, eager to see; and among the latter, again, some uncritically assenting, though the expected result has not yet properly been obtained, and others, accurate and conscientious, unsatisfiedly watching—for what is to be seen often lies close to the extreme limits of their power of perception. Banishment of vivisection from physiological instruction would be one of the grossest injuries to medical culture, and be heavily punished in the quality of the physicians produced.[1] This would be the price at which the saving

[1] Among those that find fault with demonstrative vivisection, it is sad

of the small sacrifice of animal life required by lectures would have to be purchased. The experiments concerned are just of remarkable utility, perhaps even of more utility than the individual experiments of actual research.

Another proposal is to confine vivisection to the physiological laboratories founded and kept up by the State. With these, would, of course, have to be included also at least the pathological institutes, where experiment is hardly less used than in the physiological ones. This limitation, though much less serious than the preceding one, would yet be a great and unjustifiable infliction of hardship on private men of science and on men that pursue research along with other occupations. Do people, instead of being grateful to men that from their own means keep up laboratories or in their own houses devote to science a scanty leisure wrung from practice, wish that these private laboratories, where so many important investigations have been made, should be laid under interdict? Nay, *everyone* but the director of the State institute may come into the position of having to experiment at home. Differences of opinion often oblige one of the parties concerned in them to abstain from the use of the public laboratory. Suppose, now, the disputed point were just one that could be settled only by vivisection; is, therefore, one of the parties to be thenceforth condemned to silence?—Lastly, what a bad thing a law is that cannot be enforced? Could anything be more easily evaded than a prohibition of certain experiments in private houses? In any case, there would need to be an exceptional provision for medical men. But then the whole limitation would be illusory, till it were shown that non-medical people had any wish to

to find the celebrated physicist, Sir William Thomson (see *Vivisection*, pp. 134 and 135). However, he seems to have been somewhat carried away by the humour of the Glasgow meeting of the Society for the Prevention of Cruelty to Animals at which he spoke, inasmuch as he goes the length of declaring that even in *physical* lectures experiments are a perfectly superfluous, though harmless addition. In this declaration, few teachers of physics could be got to concur with him.

perform vivisections; and I am as yet not aware that they have.

Again, the following other proposal is a very objectionable one, namely, the proposal that only Teachers of Physiology are to have the right of performing vivisections, whether for purposes of research or for purposes of instruction. In the first place, this is illogical, inasmuch as it requires that the very difficult art that the teacher of physiology has to be thoroughly master of shall never have been practised by him before the moment of his appointment or induction. It likewise denies a very large portion of physiological research to everyone that has not both chosen the career of a teacher and already to a certain extent been successful in it; and thus it creates a huge monopoly, for admission to which, besides personal recommendations, also the favour of others is requisite. Moreover, it is so blindly framed as to take no account whatever of teachers in other departments of medicine. Pathology is no longer to be allowed to study morbid processes experimentally, pharmacologists and toxicologists are denied the privilege of testing drugs on animals, Histology must henceforth dispense with so-called natural injection, and so on.

But the petitioners in favour of the proposal would readily concede these things. The point of it is directed rather against laboratory practice. In a word, Students and Medical Men must not vivisect. Henceforth, only the full-fledged Professor may experiment.

Where, however, is the future supply of physiological investigators to come from, if not from the physiological laboratory? Many young medical men attend it expressly for the purpose of fitting themselves for physiological research. Others are for ever won to Physiology by the work there done by them as students of General Medicine. Lastly, yet others, as pupils under the immediate guidance of the teacher, there make valuable contributions to Physiology without giving up their intention of becoming medical practitioners. Just look through the pathological archives! A great part of the detail-work contained in them comes from young medical men that are since become simple country practitioners. Students and young doctors of all countries have, in Germany, Switzerland, and France, for a short time been fellow-workers at Physiology; and no one would be willing to dispense with their contributions. Let laboratory workers be forbidden vivisection, and Physiology is robbed of an enormous contingent of her promoters.

England presents us with the strange spectacle of a more or less passionate and finally victorious agitation spread over the whole country and directed against a scientific method of research. For nearly two years, the numerous English newspapers and reviews have swarmed with letters and editorial articles on vivisection; bulky papers have appeared on the subject; and Parliament has had a bill for the limitation of vivisection presented to it, and—has accepted it.

The *quasi*-official centre of all the agitation against vivisection is the influential Royal Society for the Prevention of Cruelty to Animals, which has already for sixteen years turned its attention to the subject. "Deputations have waited on learned bodies in this country and in France; Congresses have been called; papers have been written; newspaper articles have been published; prizes have been awarded to writers of best essays;[1] innumerable letters have been forwarded to, and general discussion has been stimulated in, the public journals; the surveillance of detectives (!) has been carried on; and, lastly, the prosecution of offenders has been vigorously pursued."[2] The prosecution that the last clause alludes to related to a lecture on the action of absinthe, delivered by Dr. Magnan, of Paris, at the Norwich Meeting of the British Medical Association;

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[1] The prizes were awarded to Messrs. Fleming and Markham.

[2] *Vivisection*, pp. iv and v.

in which two experiments on dogs were performed (before medical men and others). It was only the lecturer's being a foreigner that saved him from punishment. This case and certain letters from Florence about the vivisections of Professor Schiff gave a new impulse to the exertions of the Society, and may be said to have determined the outbreak of the general storm. The Society, which goes to work with English gravity and thoroughness, and appoints a committee that proceeds with the establishment of facts and with the collection of material, is now, for the Hotspurs, far too moderate and slow. In January 1875, its Executive Committee receives a deputation that, in a memorial, warmly urges it to take up the battle against vivisection. The memorial is signed to a large extent by the highest nobility, by clergy, and by officers.[1] Moreover, a special "Society for the Abolition of Vivisection" is formed, which is alleged to consist principally of fanatical women. Its publications are garnished with passages from the Bible, and the behaviour of its representative before the Royal Commission of Inquiry makes it seem not very unlikely that the allegation is true.[2]

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[1] Among the signatures, are those of four archbishops, ten bishops, seven deans, seventeen reverends, one prince, three dukes, five marquesses, sixteen earls, four viscounts, numerous lords, ladies, and sirs, twenty-seven higher officers, and twenty-five members of parliament. The remaining number is comparatively small, but includes even those of some doctors of medicine. The memorial is printed in *Vivisection*, p. l. and following pages. Among other things, it wishes that every publication of a cruel experiment shall be made a legal ground for the prosecution of the publisher, and thus throw on the operator the *onus* of justifying the deed.

[2] [The "Honorary Secretary" here alluded to having refused to answer certain questions put by the Commission about the composition and proceedings of the mysterious body he claimed to represent, and Mr. Holt, the only other member of it that seems to have been examined by the Commission, having been unable to do so, the Vivisection Blue Book gives very little information on these points. The Book, however, mentions, with reference to a correspondence given in it (p. 326), that the list of the Committee of the Society is headed by the name of Sir George Duckett, Bart., of Weald Manor House, Bampton, Oxfordshire.

In this correspondence, we have: (1.) Intimation by Mr. Baker, Secretary

Meanwhile, in consequence of a meeting held in London in 1874, the vivisection question is discussed in Parliament; and, by a Cabinet Order of 22d June 1875, a Royal Commission is appointed to inquire into the matter, take evidence, and report what measures, if any, may be desirable.

The composition of the Royal Commission and the motives that determined the choice of its members can hardly be judged of by a continental observer. The names are: Viscount Cardwell, Baron Winmarleigh, and W. E. Forster, Privy Councillors; and Sir J. B. Karslake, T. H. Huxley, J. E. Erichsen, and R. H. Hutton. Of experimental physiologists, this list contains none; and of cultivators of natural science that are known on the Continent, only Huxley. At the same time, we must in so far be content with the choice and the behaviour of the Commissioners as the Society for the Prevention of Cruelty to Animals expresses itself with some dissatisfaction about the Commission.[1] It is dissatisfied because among the seven Commissioners there are but three representatives of the Society (the Chairman—Cardwell,—Forster, and Hutton); because two Commissioners "are supposed to favour science more than our doctrines of humanity"

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to Commission, of desire of Commission that Sir G. D. would attend to give evidence before it; (2.) Consent of Sir G. D. to attend, coupled, however, with declaration that all he could say "would be . . . that the practice of vivisection, an abomination introduced from the continent, is horrid and monstrous, and goes hand in hand with Atheism," and further followed by allegation that "medical science has arrived probably at its extreme limits, and has little to learn;" (3.) Intimation by Mr. B. of continued desire of Commission for Sir G. D.'s attendance; and (4.) Declinature of Sir G. D. to attend, followed by the words: "If the Commission really wish for evidence of value, which can testify to the *hellish* practice of subjecting animals to torture, I beg to say that those I have named in the margin (*see below*) are the proper persons to afford it," and by list: "Geo. Hoggan, Esq., 13 Granville Place, Portman Square; Edwd. Curtis May, F.R.C.S., Tottenham, Middlesex; W. B. A. Scott, Esq., 16 Stonebridge Park, Willesden, N.W.; Mr. Abel, Surgeon, Gloucester; Mr. Carter, Surgeon, Gloucester; Mr. Lawrence, Hotel Keeper, Gloucester."]

[1] *Vivisection*, p. vii.

(presumably Huxley and Erichsen are referred to); because the proceedings were not public and with the press admitted; because the evidence was not taken on oath; and because the judicial form of procedure, with attorney-general, counsel, and cross-examination, was not chosen.[1]

This timidly expressed dissatisfaction is characteristic. For though the innermost wishes of the anti-vivisectionists have in no wise been fulfilled, yet really, in the proceedings of the Commission, a science stands at the bar of the Society. The Secretary of the Society, Mr. Colam, loaded with an enormous mass of material for the prosecution, makes his appearance before the Commission almost like an attorney-general.[2] Information had been taken in numerous laboratories, individuals had been interrogated, and the literature of Physiology had with wonderful diligence been ransacked for cruel experiments. Moreover, an excellent handbook of physiological manipulation[3] had been published in England itself at a moment rendered especially inopportune by the convenience of such a document for the purposes of the prosecution; and is, of course, made the very most of. The physiologists examined appear as criminals convicted beforehand.[4] It lacked only that Mr. Colam had been allowed to attend at all the meetings and prove his attorney-generalship by independent interrogation of the accused.

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[1] The proceedings of the Royal Commission were laid before Parliament in a large Blue Book: "Report of the Royal Commission on the Practice of Subjecting Live Animals to Experiments for Scientific Purposes; with Minutes of Evidence and Appendix." Printed by G. E. Eyre and W. Spottiswoode. Small folio. 388 pages.

[2] The material collected by the Society for the Prevention of Cruelty to Animals is printed both in *Vivisection*, pp. 1-150, and in the *Blue Book*, pp. 349-388.

[3] *Handbook for the Physiological Laboratory*, by E. Klein, J. Burdon-Sanderson, M. Foster, and T. Lauder Brunton. Edited by J. Burdon-Sanderson. London: Churchill. 1873. 583 pages and 123 plates.

[4] [In the debate on the second reading of the Government Bill in the House of Commons, Mr. Lowe said:—"The language of the Bill was such as to lead to the supposition that the persons against whom it was directed were persons engaged in a disreputable or doubtful trade, who were unworthy of trust and had wicked propensities, and against whom the most stringent precautions had to be taken. . . . It was one thing to make the laws for putting down wicked or immoral or cruel practices, and it was another to establish a machinery of

The very form of procedure marks the degrading position of the physiologists. If nothing more was wanted than an expert's opinion on the nature, uses, and methods of vivisection, and on the admissibility of limitations of some kind, then it had at all events been better to have called on professional men and corporations to send in well-weighed written opinions. With us, I hope, things would, in such a case, be done in this way. Moreover, if it was only an expert's opinion that was wanted, one does not understand why persons that had never seen a vivisection, but had only more or less indiscriminately collected points of indictment from writings, were, on their own proposition or at the wish of the Society for the Prevention of Cruelty to Animals, brought into the proceedings. No! People evidently wanted only to make out what *delinquencies* might happen to have been committed. Therefore every witness for the prosecution, even when he had only looked on through the chink of a door or overheard something, was welcome;[1] and therefore, also, personal

inspection and supervision which was to the last degree an insult to an educated and scientific body of men, and which imposed a stigma upon them which nothing could wash away. He objected to the Bill because it was, in his opinion, one of the most stringent and degrading character directed against the Medical Profession, telling them in so many words that they were not to be trusted to conduct experiments, and placing them in the hands of a class of officials. . . . . If persons possessing no medical knowledge took upon themselves to tamper with the life or the sensations of inferior animals, he should not object to a measure being passed to put a stop to such a practice; but what he objected to was that a number of gentlemen who had received the highest medical education, who had taken degrees of the highest merit, men to whom the most precious lives and the most important secrets, involving the happiness of families, were entrusted, who often had to exercise judicial and *quasi*-judicial functions, and who, with rare exceptions, justified the confidence reposed in them, were to be subjected to supervision and restraint as though they were capable of the most cruel and wicked acts."—*Hansard*, 9th August 1876.]

[1] What paltry matters were brought before the Commission is shown in the following case, adduced by Mr. Colam. A school-girl had told that her physiological schoolmistress (? !) had during the hour of lecture cut up a lobster

interrogation was chosen. Oral hearing is excellent where we want, by surprising the witness with questions, to prevent concealment of truth, that is, where misdemeanour or crime is to be brought to light. *Here*, it was a blunder, and an insult to science.

And of what kind was this oral hearing? Men that, accustomed to the quiet work of the laboratory, cannot give evidence with the dexterity of cunning criminals are stormed with questions that for the most part admit only of "yes" or "no" answers. It is only exceptionally that they are allowed, by unfettered statement, to give a detailed elucidation of the subject as *experts*. The embarrassment produced by the presence of note-takers or shorthand writers—every word is noted down and printed—explains many unguarded answers that, by a hearing in the interests of the prosecution, are spun out and taken advantage of. With us, the answers would have been different, for the very reason that public opinion trusts science just as much as it distrusts bigotry and pharisaism. In order to get a notion of the English state of matters, one has only to compare the modest tone of the evidence of the scientific men with the—to put it mildly—audacity developed, in most ridiculous scenes, before the Royal Commission, by Mr. Jesse, a *quondam* railway engineer, the Secretary of the Society for the Abolition of Vivisection. This gentleman has scraped together his material for the prosecution from the most ancient and most modern literature—from scientific men, preachers, and poets;—but is nevertheless unable to bring forward anything that has not already, in better order and with less upturning of the eyes, been brought forward by Mr. Colam. He is daunted by nothing, even presumes to interrogate the Commissioners

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and that the pieces had still moved. The researches of the Society for the Prevention of Cruelty to Animals, which was pledged to secrecy as to the name of the evil-doer (so that she could not directly be interrogated), made it likely that she had supposed the lobster to be dead.—See *Blue Book*, pp. 83 and 84; and *Vivisection*, pp. xxxiv and xxxv.

on his own account, and meets all correction and all questions as to his credentials in such a way that one cannot help wondering at the long-sufferance of the Commis sion, in not showing him the door.[1]

Under circumstances so unfavourable, we must admire the great moderation of the Report of the Commission to the Queen[2] (of the proceedings in the bosom of the Commission, the Blue Book, of course, tells us nothing). Moreover, the Society for the Prevention of Cruelty to Animals actually, in its book, lets a certain dissatisfaction with this Report very cautiously peep out. The fundamental propositions of the Report are the following :—

The chief aim of legislation about vivisection must be to make the use of anæsthetics obligatory. Entirely to forbid vivisection would lead to numerous contraventions of the law or to general emigration of the students to the Continent, and thus to no improvement in the lot of the animals. Moreover, vivisection is useful for the alleviation of human suffering ; a proposition of whose truth the Commission has been satisfied by the evidence of eminent men, especially of Sir Thomas Watson and Sir James Paget.

Interesting and characteristic is the proof of the utility of vivisection that the Commission derives from the principal evidence. Painful experiments on animals may, according to the Commission, be considered under the three following heads :—(*a*) Operations with the knife. The Commission holds that their utility may be substantiated by numerous discoveries ; for example, by that of the circulation, which, again, has been of infinite service to medicine and surgery.[3] (*b*) Administration of poisons, for the sake of a knowledge of their actions. The Commission holds that the importance of such experiments is shown by the efforts that are being made to find an antidote for snake poisons, which annually cost many thousands of Her Majesty's Indian subjects their lives;[1] such a remedy being discoverable only by experiment. Also that such experiments seem to have led to the discovery, in nitrite of amyl, of a means of bringing the so-called spasm of the heart (*angina pectoris*) in some degree under medical control; that both men and animals have been largely indebted to them for the discovery of anæsthetics; and that without certain of them on strychnia, it would perhaps have been impossible to convict William Palmer.[2] (*c*) Experimental production of disease. The

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[1] See *Blue Book*, pp. 219-224, 270-278 and 314-324.

[2] *Blue Book*, pp. vii-xxiii. Also reprinted in *Vivisection*, pp. 191-218.

[3] [Similarly, Dr. W. B. Carpenter, speaking of Brown-Séquard's experiments, says :—" One of the most valuable of these, in its practical bearing, was the section of the spinal cord. At the time when he took up his inquiry, it was the received doctrine in physiology that the division of the spinal cord in the back would necessarily destroy life. Now this had a very important bearing upon the treatment of patients who suffer from accidental injuries to the

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spine. Cases of that kind are very common in the London hospitals; cases where men fall from masts of ships and strike the back, and have complete paralysis of the lower limbs; and every surgeon knows that it is excessively difficult to keep such patients alive for any considerable length of time, and that nurses suppose that they must die, and will neglect them. Brown-Séquard desired to ascertain if there was any necessarily fatal result from that experiment. He performed this section of the spinal cord in a great number of animals of different kinds . . . ; and the immediate result, of course, was to produce complete paralysis of the hinder limbs; but by the most careful and tender nursing of these animals, he was able to keep them alive . . . ; and in that manner, . . . he established the position that the spinal cord may be completely restored and the power of the limbs completely regained. Now this complete restoration of the spinal cord is not only a physiological fact of the very greatest interest, but of the greatest practical value to Man; because it encourages all the attendants of a sufferer under these circumstances in doing exactly what Brown-Séquard did with his animals, namely, giving the most careful attention to all the minutiæ which should prevent, remove, and antagonize so far as possible the consequences of the injury, in the hope, which has been now realized over and over again, of complete recovery."—*Blue Book*, p. 280, q. 5604.]

[1] ["I believe that there are not less than 20,000 deaths from snake bites annually in India."—*Sir James Paget, Bart.*, in *Blue Book*, p. 14, q. 305.]

[2] [So too, according to Dr. Alfred Swaine Taylor, the return of a verdict of wilful murder by a coroner's jury against a woman charged with poisoning her stepchild was prevented only by means of specially instituted experiments on rabbits showing it to be possible for presence of arsenic in the stomach to be due to application of arsenical ointment to the head for cure of ringworm.—*Blue Book*, pp. 55 and 56, q. 1162.

And Dr. T. Lauder Brunton states that Hüter, of Berlin, in a case of char-

Commission holds that the nature, cause, manner of diffusion, and limitability of certain diseases (the examples are not just happily chosen) have been recognized by means of such experiments; and that mankind has thereby been spared suffering.

As to the necessity for, and admissibility of legal limitations, the medical authorities examined have expressed themselves rather variously (consider what firmness was required for any opposition, in face of the enormous apparatus of the Society for the Prevention of Cruelty to Animals, of the composition of the Commission, of the popular clamour, and of English bigotry!). Mr. Lister protests against all interference that from the outset treats physiologists as cruel persons.[1] Others see nothing injurious in interference. Fergusson, in his old age, has thought better of the vivisectory propensities of his youth; and is shocked at what now goes on in England. Burdon-Sanderson (Professor of Physiology in London) has nothing to say against the prohibition of vivisection to non-medical persons, though they are already, by difficulty, expense, &c., otherwise deterred from it. In the main, assents to the general outline of Playfair's Bill (see further on).[2] Ferrier (known from

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coal poisoning, that is, of poisoning with a mixture of carbonic acid and carbonic oxide, getting no good from simple artificial respiration, which suffices for resuscitation in simple carbonic acid poisoning, was in consequence of Claude Bernard's discovery, made by experiments on animals, "that carbonic oxide forms a compound with the blood which is incapable of taking up the oxygen of the air in the lungs" led to supplement the artificial respiration by withdrawal of some of the poisoned blood and replacement of it with fresh blood and thus saved the patient's life.—*Blue Book*, p. 284, q. 5670.]

[1] [With regard to legislation, Sir William Gull says that if it "were calculated to hamper either scientific enquiry or the pursuit of science," he would "think it most deplorable;" that even if it were clear of that objection, he would still "see a moral and very serious objection," in the fact that "it would imply that the scientific men of this country and the students of science required legislation," which he denies; and that he thinks "it would prevent the spread of scientific knowledge amongst students who are already too glad to get their knowledge out of books."—*Blue Book*, p. 265, questions 5472 and 5473; and p. 266, q. 5476.]

[2] [Is, however, not aware of there being any necessity for any legislation whatever.—*Blue Book*, p. 142, q. 2687.]

certain experiments on the brain) fears that statutory measures might, by injuring science, discredit England; but, on the other hand, thinks that, in presence of the existing agitation, it is desirable specially by statute to dissociate scientific research from the offences punishable under the law for the prevention of cruelty to animals (so-called Martin's Act).[1] Rolleston (Professor in Oxford) is for statutory limitation to laboratories.[2] Foster (Prælector in Physiology in Cambridge) considers statutory measures to be on the whole superfluous. At most, vivisection might be forbidden to non-medical persons. Gamgee (Professor of Physiology in Manchester) holds that statutory licences would be admissible, if no vexatious spirit prevailed in the granting of them. Regulations might be directed only against vivisection by incompetent persons or for no definite object. Rutherford (Professor of Physiology in Edinburgh) cautions against making the Secretary of State the immediate authority in the granting of licences for vivisection; and thinks that some scientific corporation would be better for the purpose. Also that it would be a mistake to forbid vivisection for demonstrative purposes. The Reverend Dr. Haughton (known from some works on muscular physics) declares himself decidedly against vivisection for mere demonstration; and states that all vivisection is strictly forbidden at his institution (Trinity College, Dublin). Thinks vivisection should by statute be entirely confined to research. Also that we cannot trust to the consciences of the younger physiologists.

From the evidence taken by the Commission, it is satisfied that there are and have been very cruel physiologists (as such, it mentions the deceased French investigator, Magendie).[3] Also that even in England people have sometimes practised vivisection without object or plan (a Mr. Mills had testified that some veterinary students had, in a kind of secret combination, practised it half for amusement). And a further reason for legislation is found in the fact that suspicion and abhorrence has been awakened in a

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[1] [12 and 13 Vict., c. 92.]

[2] [Dr Rolleston's blindness to the impropriety of legislation is only in keeping with his perverse and ungenerous doctrine of "every kind of original research being a gratification of self."—*Blue Book*, p. 63, q. 1287.]

[3] The English denunciations of the cruelty of physiologists are most iniqui-

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tous and of unexampled violence. Dr. Abernethy calls the very deserving Spallanzani (who died in 1797) "a filthy-minded fellow" (*Vivisection*, p. 124); and the already-mentioned Mr. Maitland compares Schiff to the wholesale murderer Thompson, making out that as avarice could give rise to every crime in the latter, so also science can in the former (*Examiner*, 17th June 1876). Magendie is universally abhorred. It is chiefly against continental physiologists that the accusations are directed: in England, the number of cruel experiments is said to have been much smaller (for the very simple reason that physiology has long been neglected in England). With regard to these accusations, it must not be forgotten that a great part of the experiments adduced were performed before the discovery of anæsthetics, and that people that trepanned and performed amputations on human beings in full consciousness could not help going also in the case of animals somewhat further than we should now-a-days do in the exaction of suffering insusceptible of alleviation. So also with the celebrated Sir Charles Bell's repugnance to vivisection, which is so often quoted in England, it is well to bear in mind that in his time anæsthesia was still unknown, and that now-a-days he would certainly not have been afraid of testing a well-founded conjecture by an experiment on the living animal. He is said to have conjectured on anatomical grounds that the anterior of the two roots of every spinal nerve is a motor nerve and the posterior a sensory one ; and many Englishmen seem to imagine that he never made the experiment that has decided this point, an experiment that in warm-blooded animals is certainly a very severe one. If this were so, then the celebrated doctrine would have to be called not Bell's, but Magendie's, or Müller's; for function can be proved only by *experiment*. But Bell actually did perform the experiment (see Bell's *physiologische und pathologische Untersuchungen des Nervensystems*, aus dem Englischen übersetzt von Romberg. Berlin, 1832. Page 25); and to maintain that he did so but *once* is only to say that he held the one experiment to be quite decisive, and, like other investigators, confined himself to what was necessary. He certainly did a great deal of other vivisection (*op. cit.*). Also, the repetitions of his experiment by Magendie, Müller, and others were in no wise superfluous. By means of them, Magendie (of whom it is also not even certain that he knew of Bell's discovery) discovered the apparently irreconcilable "sensibilité récurrente ;" and it was Johann Müller that first, by a simple experiment on the frog, succeeded in putting the truth of Bell's doctrine beyond doubt.

This, moreover, is certain, that the most eminent investigators have been the most economical with severe experiments, and that the labours most highly esteemed in the physiological world are just those where much has been got at little animal sacrifice. But this very circumstance makes it clear that the proper way of lessening such sacrifice is not by legislation, but by making the education of future investigators as complete as possible.

large and very estimable portion of the public against legitimate branches of research; a state of matters that will now be remedied.

The Commission then rejects a number of proposals that had been made, thus: (1.) total prohibition of vivisection—rejected for the reasons already mentioned;—(2.) limitation of it to experiments for objects of practical medicine—here, a remark of Helmholtz's is quoted, which points out how little one could at the time of Galvani's discovery have foreseen its future enormous practical importance;[1]—

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[1] [See page xviii. of the *Blue Book*, where the words are as follows:—"It has been proposed to enact that the object in view shall be some immediate application of an expected discovery to some prophylactic or therapeutic end, and that any experiment made for the mere advancement of science shall be rendered unlawful. But this proposal cannot be sustained by reflection upon the actual course of human affairs. Knowledge goes before the application of knowledge, and the application of a discovery is seldom foreseen when the discovery is made. The first origin of a great discovery is often, like the germ of the natural life in an animal or a vegetable, so small as to be scarcely perceptible, and yet it may contain in it the seeds of the grandest results. 'Who,' says Helmholtz, 'when Galvani touched the muscles of a frog with different metals, and noticed their contraction, could have dreamt that . . . . all Europe would be traversed with wires, flashing intelligence from Madrid to St. Petersburg with the speed of lightning? In the hands of Galvani, and at first even in Volta's, electrical currents were phænomena capable of exerting only the feeblest forces, and could not be detected except by the most delicate apparatus. Had they been neglected, on the ground that the investigation of them promised no immediate practical result, we should now be ignorant of the most important and most interesting of the links between the various forces of nature. . . . Whoever, in the pursuit of science, seeks after immediate practical utility, may generally rest assured that he will seek in vain.' As we have seen, Harvey's great discovery has been followed by remedial consequences of inestimable value, but those consequences were not foreseen by himself at the time that he made the discovery. It was, at the time that he made it, 'a mere scientific discovery.'"

The original of the quotation from Helmholtz runs thus: "Wem konnte es einfallen, als Galvani Froschschenkel mit verschiedenartigen Metallen berührte und sie zucken sah, dass achtzig Jahre später Europa mit Drähten durchzogen sein würde, welche Nachrichten mit Blitzesschnelle von Madrid nach Petersburg trugen mittels desselben Vorgangs, dessen erste Aeusserungen der genannte Anatom beobachtete! Die electrischen Ströme waren in seinen und Anfangs auch noch in Volta's Händen Vorgänge, die nur die allerschwächsten Kräfte ausübten und nur durch die allerzartesten Beobachtungsmittel wahrgenommen werden konnten. Hätte man sie liegen lassen, weil ihre Untersuchung keinen Nutzen versprach, so würden in unserer Physik die

(3.) prohibition of performance for purposes of demonstration or by students—here it is held that all that is needed is to make anæsthesia obligatory;—and (4.) the proposal of a Mr. Hoggan, that all vivisections should be performed in large halls accessible to the public,—objected to on the grounds that control by an ignorant public, which might take reflex actions for expressions of pain, would be illusory and that the experimenter would be disturbed. (Against the last-mentioned strange proposal, the Society for the Prevention of Cruelty to Animals further justly objects that it would do harm by popularizing vivisection.[1]) Moreover, the proposals that urari should (against the doctrine of the schools, that it paralyses only motion) be reckoned an anæsthetic and that the frog, as an animal that is rather insensitive and is difficult to chloroform, should be excepted from any statutory provisions are likewise rejected by the Commission, as resting on disputed propositions.

After a short criticism of the bills before it (see further on),[2] the Commission recommends: that experiments on living animals, whether for research or for demonstration, shall be under the control of the Secretary of State, who shall have the power of granting and withdrawing licences entitling persons to perform them; that these persons shall be bound to avoid all unnecessary infliction of suffering, and to reduce all necessary to a minimum; that such more particular conditions shall be imposed as experience may from time to time dictate, but shall not be stereotyped by statute; that the Secretary of State shall have the guidance of advisers of competent knowledge and experience,

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wichtigsten und interessantesten Verknüpfungen der verschiedenartigen Naturkräfte untereinander fehlen. . . . Wer bei der Verfolgung der Wissenschaften nach unmittelbarem praktischen Nutzen jagt, kann ziemlich sicher sein, dass er vergebens jagen wird."—*Populäre wissenschaftliche Vorträge von H. Helmholtz. Erstes Heft*, 1865, page 26.]

[1] [*Vivisection*, p. viii.]

[2] [These Bills were: that of the Society for the Prevention of Cruelty to Animals, that of Lord Hartismere, and that of Mr. Lyon Playfair.]

from time to time nominated by himself; that he shall have the right of most complete control by inspectors; that in case of notified intention of withdrawal of license, the threatened party shall be entitled to demand public inquiry before one of the Judges of the Supreme Court; and that the Secretary of State shall have the power of exempting unlicensed persons from prosecution for experiments occasioned by necessity.

In addition to the Report proper, signed by the whole Commission, a single Commissioner, Mr. Hutton, makes a separate report, in which he further proposes that experiments on domestic animals properly so-called, namely, dogs and cats, shall be entirely forbidden. For, in the first place, the demand for these animals, which are not subjects of a regular trade, is a continual temptation to theft,[1] and that of a kind particularly distressing to the owners of the animals; in the second place, these animals are to a certain extent civilized, so that they are particularly sensitive to pain; and, in the third place, they are friends of man, and to torture them is a kind of treachery. Other domestic animals, such as horses, cattle, and sheep, need not be put on the same level, inasmuch as they are for most experiments too expensive and as most experiments on them consist in artificial inoculations of disease (?) that are undertaken in the interests of the animals themselves, and not in those of man. In his wishes, Mr. Hutton stands alone among the Commissioners. Nevertheless, he seems to have been listened to in higher quarters; for, in effect, his appendix has passed into the Government Bill.

The views that regulate the considerations of the Commission are extremely limited. This is due partly to the position hitherto occupied by Physiology in England, and partly to the utilitarian propensities on that side of the Channel. All through the Report, the first question that meets us is: "Of what use is experiment for practical medicine?" Wherever such use is evident, there even the worst things are allowed; whilst for satisfaction of pure instinct of research even small sacrifices are dreaded. The very meanness of this, which I have already tried to show, should deter people from putting the naked principle of utility into the foreground. And this stupid aiming at utility, how short-sighted it is! For though the Commission indeed once rouses itself to quote Helmholtz's declaration that research aiming at practical utility necessarily remains unfruitful, yet it has no other argument for the justification of vivisection than that we are indebted to it for better knowledge of, and better means of treating disease. In close connection with this subject is the fact that in England physiology has till lately been cultivated only incidentally, by men engaged in practice; and been looked on as the mere handmaid of medicine. It is only lately that people have there too begun to take the German view, that Physiology is an independent natural science—like Physics or Chemistry—that investigates life untroubled as to whether her results directly or at all advance medicine; though they will presumably, in the long run, always do so.[1] Nevertheless, even in England, special chairs and institutes have now, at last, been given to this science; and a number of men of great merit are already working there with the independence that alone befits their subject.

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[1] [Surely the proper remedy for such a state of matters would have been not suppression of Science, but enforcement or amendment of the law against Theft.]

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[1] [See also the following, from a published Address to Medical Graduates, delivered in 1875, by Dr. A. Crum Brown, Professor of Chemistry in the University of Edinburgh: "No fact in Anatomy, Physiology, Pathology, or Therapeutics is trivial or unimportant. It is melancholy to hear educated men speak of any such facts as 'unlikely to be of any practical use.' Every such fact is certain to be of the greatest practical use. We may not indeed be able to apply it immediately, but we pick it up—not because we think it possible that at some time or other we may want it, we pick it up because it is a part of that of which we want the whole, and which can only be got in fragments, each of which is itself small, and therefore despised by those who have no true knowledge or love of science."

And the following statement by Dr J. Burdon-Sanderson, Professor of Human Physiology in University College, London: "The utility of physiological study, it seems to me, ought to be judged of, not so much by its direct appli-

These men have, however, in face of the narrow-minded interrogatory they have been subjected to, and in consequence of the novelty of their point of view, been unable to express their principles with the openness and confidence that with us would have been natural. Moreover, they have still had to rely chiefly on practical utility; and accordingly the strongest objections to the intended limitations have but very imperfectly been taken advantage of.

We have still to mention the Bills that have been discussed in England.

At the head of the list, must be put the resolutions accepted, in 1871, by the British Association, and approved of by such men as Darwin, Owen, Huxley, Gull, and Jenner. They are as follows:—"i. No experiment which can be performed under the influence of an anæsthetic ought to be done without it. ii. No painful experiment is justifiable for the mere purpose of illustrating a law or fact already demonstrated; in other words, experimentation without the employment of anæsthetics is not a fitting exhibition for teaching purposes. iii. Whenever, for the investigation of new truth, it is necessary to make a painful experiment, every effort should be made to ensure success, in order that the suffering inflicted may not be wasted. For this reason, no painful experiment ought to be performed by an unskilled person with insufficient instruments and assistance, or in places not suitable to the purpose, that is to say, anywhere except in physiological and pathological laboratories, under proper regulations. iv. In the scientific preparation for veterinary practice, operations

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cability to disease, as by the certainty which exists in our minds that eventually it will be the guide of practice in medicine; and I wish to emphasize this . . . particularly, not because I am insensible to the fact that there are a great many direct applications of physiology, but because I think that what ought to encourage us above all is that certainty of which I have spoken."—*Blue Book*, p. 119, q. 2296.]

ought not to be performed upon living animals for the mere purpose of obtaining greater operative dexterity."[1]

The Bill of the Royal Society for the Prevention of Cruelty to Animals, handed in by Mr Colam to the Royal Commission, makes the following proposals:—"Vivisections," that is, experiments that produce pain or disease in animals, as well as such operations on living animals as are not meant for their cure in disease, shall, from 1st January 1876, be performed only at legally registered places; the registration always having force only for twelve months. Only persons expressly licensed by the Secretary of State shall perform, or, except as assistants, take part in performing vivisections. The licences may, on application, be given to fellows or members of a College of Physicians or Surgeons, graduates or licentiates in medicine, persons otherwise entitled to practise medicine, and professors or teachers of anatomy, medicine, surgery, or physiology; provided the paper of application be accompanied by a certificate signed by the President of the Royal Society or of a College of Physicians or Surgeons and by a professor of physiology, medicine, or anatomy. The licence may be revoked by the Secretary of State. Vivisection for instruction is forbidden, as well as vivisection for attainment of manual skill. Every animal used for vivisection must first be completely anæsthetized, and must be killed before coming out of the anæsthesia. Assistance in the presence and under the direction of a licensed person may be given him even by unlicensed persons. Every licensed person must keep a book in which are entered, in plain words and figures, and with consecutive numbers, the particulars of every vivisection; its object, duration, and result; the nature of the animal, and the name, description, and address of the person it was got from; and the nature of the anæsthetic. The rest of the Bill relates to police regulations and to penalties (up to £10, or three months' im-

[1] [*British Association Report*, 1871, page 144.]

prisonment, the first time; and to £50, or six months' imprisonment, in cases of repetition).

Lord Hartismere, in the House of Lords, brought in (in May 1875) a Bill to the following effect:—Every place where it is intended to perform vivisections must be notified for official registration; and the registration shall continue in force for twelve months, and no longer. Every place so registered may at any time be visited by any Inspector of Anatomy. Anæsthesia shall, except as after-mentioned, be obligatory; and for the purposes of this regulation urari shall not be deemed an anæsthetic. Anyone may petition the Secretary of State for a special licence to perform vivisections without anæsthesia; and the licence may be granted or refused, shall cost £10, and shall continue in force for six months, and no longer. Penalties up to £20.

Mr Lyon Playfair, Mr Spencer Walpole, and Mr Evelyn Ashley, in the House of Commons, proposed (also in May 1875) as follows. Vivisections may be performed for the purpose of new scientific discovery, but for no other purpose. Where the animal, if allowed to live, would afterwards suffer, it must be killed immediately on the termination of the experiment. Anæsthesia may be omitted only where it would directly frustrate the object of the experiment. Experiments without anæsthesia require a licence from the Secretary of State, and must all be registered according to a prescribed form. Applications for the licence must be accompanied by a certificate signed by the President of the Royal Society or of a College of Physicians or Surgeons and by a professor of physiology, medicine, or anatomy; provided that if the applicant be a professor of, or lecturer in physiology, medicine, anatomy, or surgery, no such certificate shall be required, but, instead thereof, the application shall be countersigned by the registrar, president, principal, or secretary of his university or college.

Lastly, the following are the principal contents of the Government Bill, laid before the English Parliament.[1]

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[1] [Presented to House of Lords by Earl of Carnarvon. Read there first time, 15th May 1876.]

Act may be cited as "The Cruelty to Animals Act, 1876."[1]

Penalties up to £50 the first time and £100 or three months' imprisonment in cases of repetition are imposed for every contravention of the following restrictions. 1. Every such experiment on a living animal as is calculated to give pain must be performed with a view only[2] to new discovery for the advancement of[3] knowledge useful for saving human[4] life or alleviating human[4] suffering. 2. Must be performed in a registered place.[5] 3. Must be performed by a person holding a legal licence to perform it. 4. During the whole of the experiment, there must be complete anæsthesia. 5. If the pain is likely to outlast the anæsthesia, or if serious injury has been inflicted, the animal must be killed before it awakes. 6. The experiment must not be used for lecture illustration. 7. Nor for attainment of manual skill.

From these restrictions, however, there are the following *exceptions*. (1.) Experiments with anæsthesia may be used for lecture illustration, on legal certification that they are necessary for[6] instruction of the persons lectured to, with a view to their acquiring[7] knowledge useful for saving human[4] life or alleviating human[4] suffering. (2.) Experiments without anæsthesia may be performed, on legal certification that anæsthesia would frustrate their objects. (3.) The killing of the animal before it awakes may be omitted, on legal certification that such killing would frustrate the object of the experiment and provided the animal be killed as soon as that object is attained. (4.) Experiments may be performed without a view directly to the advancement of[1] knowledge useful for saving human[2] life or alleviating human[2] suffering, but only for the purpose of testing for the advancement of such knowledge a particular former discovery alleged to have been made, on legal certification that such testing is necessary for such advancement.

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[1] [This is the *short* title of the bill. The *full* one was at first "An Act to prevent cruel Experiments on Animals," but was afterwards (20th June) altered to "An Act to amend the Law relating to Cruelty to Animals," which is also the title of the Bill in its finally amended form of Statute.]

[2] [Statute omits "only."]

[3] [Statute inserts "physiological knowledge or of."]

[4] [Statute omits "human."]

[5] [Statute allows Secretary of State to dispense with registration of place, provided performance be not for instruction.]

[6] [Statute inserts "due."]

[7] [Statute inserts "physiological knowledge or."]

Of further restrictions, there are the following. 8. Urari shall not for the purposes of the act be deemed an anæsthetic. 9. No such experiment as is calculated to give pain shall be performed on a dog or cat.[3] 10. No such experiment on living animals as is calculated to give pain shall be exhibited to the general public. 11. The approval and registration of the places of experiment (see restriction 2) shall be done by the Secretary of State. 12. So shall the granting of the licences (see restriction 3), the determination of their duration and possible revocation, and the binding to certain conditions. 13. The holders of the licences shall from time to time make such reports to the Secretary of State of the result of their experiments in such form and with such details as he may require.[4] 14. The Secretary of State shall cause the registered places to be from time to time visited by inspectors named, and having their salaries[5] determined by him. 15. Certificates for the already-mentioned exceptional cases must be signed by the President of the Royal Society or of a College of

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[1] [Statute inserts "physiological knowledge or of."]

[2] [Statute omits "human."]

[3] [Statute only provides that no such experiment as is calculated to give pain shall be performed without anæsthesia on a dog or cat except on legal certification, with assignment of reasons, that the object of the experiment will be frustrated unless it be performed on an animal similar in constitution and habits to a dog or cat and no other animal is available. Moreover, Statute provides that no such experiment shall be performed on a horse, ass, or mule except on legal certification that the object of the experiment will be frustrated unless it be performed on a horse, ass, or mule.]

[4] [Statute allows Secretary of State to dispense with reports.]

[5] [Statute omits mention of salaries.]

Surgeons or Physicians[1] and by a professor of physiology, medicine, anatomy, or surgery[2] in one of the universities or in a college incorporated by Royal Charter,[3] an intending experimenter's own signature as one of these persons being disallowed; may be for time or for series of experiments; shall be ineffective till a week after they have been forwarded in copy to the Secretary of State; and may at any time be disallowed or suspended by him. 16. Every judge of a High Court in England or Scotland or superior court in Ireland or court substituted therefor may grant licences or certificates wherever he is satisfied that the experiments concerned are essential for justice in a criminal case. The rest of the Bill relates to formalities.

With four more or less important alterations—namely: (1) that the exemption of dogs and cats is reduced to a provision that no painful experiment without anæsthesia shall be performed on them except on legal certification that its object will be frustrated unless it be performed on an animal like one of them and that no other animal is available; (2) that the Secretary of State is allowed to dispense with registration of places not used for experiments for instruction; (3) that he is allowed to dispense with reports; and (4) that his assent is requisite for every prosecution of a licensed person—and sundry very unimportant ones—such as the insertion of a provision that no painful experiment without anæsthesia shall be performed on a horse, ass, or mule except on legal certification that its object will be frustrated unless it be performed on one of them;[4] and the insertion of a provision that the Act shall not apply to invertebrate animals,[1]—with these alterations, this Bill is now become law. At one moment, it seemed as though the united exertions of those affected by it would succeed in stopping its progress. A large number of medical men presented an address[2] to the Home Secretary, professors and other teachers of physiology published a memorandum, and university corporations made representations. Moreover, the second reading in the House of Commons (on 9th August 1876) met with smart opposition. But yet the incredible came to pass. On the 11th of August,[3] immediately before the close of the session, in a House exhausted by long sittings and almost empty, after lame attacks and lame defences, and by divisions that never more than 109, and at last only 73 members took part in, the Government that had allied itself with the party of the female fanatics (till the last moment, ladies petitioned Parliament) triumphed; and in the country of Bacon, Harvey, and Newton, for the first time in modern history, fetters were put on a science. The Government durst not bring in a Bill to abolish the effete English weights and measures; but disposed of a science in a few months.

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[1] [Statute also allows signature of President of Royal Society of Edinburgh, of Royal Irish Academy, of General Medical Council, of Faculty of Physicians and Surgeons of Glasgow, or, in case of experiments under anæsthesia with view to new discovery for advancement of veterinary science, of Royal College of Veterinary Surgeons or Royal Veterinary College, London.]

[2] [Statute also allows signature of professor of medical jurisprudence or of materia medica.]

[3] [Statute also admits University College, London.]

[4] According to a "Vivisection Notice" dated 23d May 1876, a Meeting of the Delegates of fifty-one English Societies for the Prevention of Cruelty to

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We may here be short with what science has to say against this strangest of bills; since we have already, in

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Animals took place on that day in Jermyn Street, London, at which it was declared that the protection given by the Government Bill to dogs and cats must likewise be extended to horses, asses, and mules. Also that the Societies were much dissatisfied with the exceptional clauses of the Bill, and with the want of strictness in the control it provided for.

[1] A proposal made by the Government, at the last moment, to declare the Act inapplicable to cold-blooded animals, was refused, that is, was accepted only for invertebrates. Here too, we have the merest caprice in the distinction between moral and immoral. [The conduct of the Government in allowing the substitution of "invertebrate" for "cold-blooded" was justly characterized by Mr. Lyon Playfair, in the House of Commons, as "a breach of the understanding between the Home Secretary and the medical men."—*Hansard*, 11th Aug. 1876.]

[2] ["Memorial." See *British Medical Journal*, 8th and 15th July 1876.]

[3] [See note on page 1.]

the foregoing, discussed the matter. We have shown how objectionable it is to give particular places and particular persons a monopoly of an indispensable method of scientific research, how superfluous to make anæsthesia obligatory, how absurd to order the immediate destruction of the animal, and how fatal for instruction to forbid lecture experiments.

But the Bill is radically bad even from the point of view of general legislation. In the first place, it bears all the marks of exceptional legislation.[1] In every line, we see that it has been framed by a weak government under pressure of a momentary agitation. Yielding to the dictatorial spirit of pharisaism, it forbids a special branch of supposititious animal torture merely because that branch in particular has excited the displeasure of certain people ; and does so untroubled at the fact that, as we have already shown, ill-usages and mutilations a thousand times worse, on a scale a thousand times greater, and inflicted solely for the sake of gain or luxury are still without molestation practised by the denouncers of vivisection themselves, on their own landed estates. To all the helplessness of such law-manufacture, cling technical details that have been gone into only in consequence of the detective researches of the denouncers or in consequence of voluntary evidence of the investigators. It mentions urari without having any idea that many other substances are already known to be of like action with, and capable of being used instead of it ; that new ones may daily be discovered to be so ; or that Physiology, if she were really hard-hearted enough to *abuse* such substances, would have nothing to do but to keep them from the ignorant eyes of the manufacturers of such laws.

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[1] [In the debate on the second reading of the Government Bill in the House of Commons, Mr Lowe said : "He wished to point out that this Bill was drawn up without the slightest reference to the existing state of the law in England, inasmuch as that law was entirely confined to domestic animals. . . . . By the Bill, two whites were made a black—that was to say, the infliction of pain, which was not a crime, and the trying of an experiment, which was not a crime, when added together made a crime ;—and the result was that in the only case in which the suffering of animals could be entirely justified by the end in view the infliction of it was made penal. The crime created by the Bill was not the infliction of pain upon an animal, but the infliction of that pain for the purposes of experiment for the benefit of mankind." And then, after pointing out that in this way the infliction of pain on a non-domestic animal for the sake of an experiment in the interests of human life might render the inflicter punishable under the provisions of the Bill, whilst the same infliction for mere amusement, and for the gratification of a morbid curiosity, would not do so, he went on to say : "Was it possible to reduce legislation to a lower depth of absurdity? The only parallel to it was the defence of the persons charged under the Act against wounding with intent to disfigure, that they had wounded a man with the intent not to disfigure, but to murder him."—*Hansard*, 9th Aug. 1876.]

To dogs and cats, the English Government assigns a position of preference over all the rest of the animal world. Because one of the refined natures that contributed to the Bill happens to bestow particular affection on these two species, they are entirely withheld from wicked Physiology. Had the influence of Mr. Hutton been at the command of a sportsman or pigeon-breeder, then—less unfortunately for Physiology, since dogs and cats, as the only easily got representatives of the carnivorous mammalia, cannot be dispensed with by it[1]—the privilege would have been shared by other animals. As was to be expected, the Societies for the Prevention of Cruelty to Animals have carried an amend-

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[1] [In the memorandum published by professors and other teachers of physiology and mentioned at p. 52, we have the following :—

" Cats and dogs are the only flesh-eating, warm-blooded animals which are available for observation in England. Agreeing in these respects with man, these animals (and especially the dog) resemble him in their digestion, assimilation, secretion, nutrition, and the chemical processes of life generally.

As regards the general structure and arrangement of the nervous system, the carnivora also resemble man more closely than rabbits, guineapigs, or other smaller animals.

For the comparative study of the diseases to which the lower animals are subject in common with man, it is necessary to have recourse to animals of various species. Thus, while rodents are prone to tuberculosis, cancer, which is rare in many animals, is common in dogs. It is on them, therefore, that observations must be made as to the nature and origin of this disease. The process of fever as it occurs in dogs, closely resembles in its frequency, its relation to bodily temperature and circulation, and in other respects, the same process in man. Rabbits are so extremely liable to accidental infection after wounds, that their very susceptibility renders them unfit for experiments on ment that exempts also horses, asses, and mules from vivisection.

Still more absurdly than in this sentimental paragraph, does the helplessness of the Bill come out in the series of *exceptional provisions*, by which most of the rigorous provisions are nullified. The Bill provides : (1) that vivisection shall never be performed without a view to new discovery, never without anæsthesia, never without immediate destruction of the animal, and never for instruction ; and (2) that it may be performed without a view to new discovery, without anæsthesia, without immediate destruction of the animal, and for instruction, if the physiologists deem such performance necessary—that is, legally certify, or (by professional brethren) cause it to be certified, that it is indispensable for the advancement of practical medicine.[1] *Sapienti sat!* Moreover, as has already been mentioned, while the Bill in its original form provides that vivisection shall never be performed on dogs and cats, the Statute, that is, the Bill in its amended form, favours them over other vertebrata only to the extent of providing that no painful experiment without anæsthesia shall be performed on them except

surgical fever and the allied diseases ; so that researches on this subject could not be made unless other animals were available.

Rabies must be studied in dogs and cats, with a view to preventing its spread in these animals, and so removing hydrophobia from the list of human maladies. The same remark applies to various internal and external parasitic diseases, which are transmitted from dogs or cats to other domestic animals, and even to man himself. In the experiments by which the relation between tape-worms and bladder-worms was established, and so the means of preventing these diseases in man ascertained, dogs were necessarily used.

The same considerations which apply to the study of disease in the lower animals may be extended to the investigation of the action of remedies and of poisons ; for here also, the susceptibility of different animals is so various, that a careful selection must be made according to the special purpose in view. But, in the majority of instances, the carnivora from their approaching man more closely in their general organization are to be preferred. In several lines of investigation relating to the action of medicines they alone can be fitly employed."—*Memorandum of Facts and Considerations relating to the "Cruelty to Animals Bill," by Teachers of Physiology in England, Scotland, and Ireland*, pp. 4 and 5.]

[1] [Statute allows of substitution of Physiology for Practical Medicine.]

on legal certification that its object will be frustrated unless it be performed on an animal like one of them and no other animal is available.

The worst of these and of all other legislative measures against vivisection is that they cannot be enforced, inasmuch as their observance or non-observance cannot be ascertained. Laws, however, that cannot be enforced are not only useless, but also *mischievous;* for they destroy respect for the legislature and demoralize that portion of the population that evades them with impunity.[1] We have here to do with processes that withdraw themselves from publicity. Who is to keep the laboratories, or even only the public ones, under continual supervision? It would not even be enough to station a police functionary permanently in each of these institutions; for it is only an expert that can judge what case really contravenes the law and must accordingly be reported. Lastly, in nineteen cases out of twenty, the accused, as the only expert, will have easy work with the judge. The prosecutions will mostly end in acquittal. Instead of this, however, the number of indictments will perhaps only be increased by the difficulty of determining what constitutes a contravention of the law. A species of informant will perhaps be developed that has hitherto been quite a stranger to academic ground. All sorts of vindictiveness on the part of discharged laboratory servants, of dissatisfied purveyors, or even —— of plucked candidates, and spite on the part of sentimental neighbours or of cunning land-speculators, and particularly of neighbouring coachmen that have at some time or other been punished for cruelty to animals, these will give the law enough to do; and scientifically occupied men, whose time is valuable, will be always on the way between the laboratory and the court of inquiry. Such will be the first-fruits of these legislative measures.

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[1] [And if the teachers are demoralized, what becomes of the taught? And is not instruction in physiology a necessity, both for health and for morality, to every member of the community?]

But these could be borne, did they hurt only a small number of persons. The worse and more deplorable consequences of energetic administration of the law will show themselves only gradually. They will consist in gradual deterioration of physiological and medical science. It is true that the shortsighted passion of the sects will care little for this. Many agitators against vivisection belong at the same time to the adherents of the doctrine that Science must retrace her steps. The study of the English movement leaves no doubt as to this. Unsuccessful in their battle against the harmless experiments of Physics and Chemistry and the calculations of the Astronomer, these people are glad to have found a field where, instead of persecuting a science with the no longer effective reproach of antagonism to the Bible, they can do so with the accusation of wicked cruelty; and can get the chestnuts out of the fire by means of the Societies for the Prevention of Cruelty to Animals. Let us beware of giving the very least countenance to these tendencies! Scientific progress has at all times shown itself the surest lever for the elevation of our race from its misery. And here we have to do with the very science that forms the foundation of the art of alleviating human suffering. By limiting vivisection, we shall perhaps save a certain number of animal lives—a number, however, that absolutely vanishes in comparison with the enormous number of such lives that man daily destroys for his own use and convenience,—and, instead, shall reap generations of bad physicians, and withhold from the following generations knowledge that, had Science been left free to develop herself, would have been gained and have increased their power of recognizing and curing disease. In a word, the animal lives saved will be *paid for in human ones.*

Let, then, our lawgivers be on their guard, and not be too ready to lend an ear to popular clamour. If the advice "*nonum prematur in annum*"[1] is anywhere in place, it is so in the domain of the legislature. At least, let people on the Continent wait the result of the hurried antivivisection legislation in England. Presumably, the law will, after all, not be enforced,[1] though sufficing to deter people from choosing Physiology as a profession. Even if enforced, however, it will hardly materially improve the lot of the animals. I believe that in moments of urgency investigators will pay no heed to it. Either they will seek to evade it, which certainly is not difficult, or they will accept the penalties. Truly, men have become martyrs for infinitely less important things, and have sacrificed more than a money fine. Do not let this be called a threatening of transgression of the law ; it is only a prophecy, deduced from the history of the sciences and from the constitution of human nature.

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[1] ["Keep (your work) nine years (before publishing it)."]

In the interests of the Societies for the Prevention of Cruelty to Animals, whose work is a beneficent and thankworthy one, we must regret that they have let themselves be drawn into an agitation that brings them into conflict with Science. Under existing circumstances, the true mission of the Societies cannot possibly lie in the preservation of animal life or in the improvement of the lot of the animal world. For, in all consistency, endeavours after these objects would necessarily lead to the protection of cockchafers against birds, and of mice against cats,—to the extermination of all predatory animals. The mission that so viewed involves a thousand inconsistencies immediately, however, becomes a beautiful and consistent one, when its educational side, the subdual of human cruelty, is turned towards us.[2] Then,

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[1] This may be read between the lines in the following clause, which the Government, at the last moment, perhaps in consequence of a compromise with its opponents, quite silently appended to the Statute : " A prosecution under this Act against a licensed person shall not be instituted except with the assent in writing of the Secretary of State." (!)

[2] With a very proper appreciation of this mission, the German Criminal Code (§ 360, No. 13) imposes penalties only on those that "publicly or offensively are guilty of *maliciously torturing or cruelly ill-using animals.*" Under this

Science can only fall in with the endeavours of the Societies: a conflict is inconceivable.

Even if, as is earnestly to be wished, the present agitation remains in our case without any legislative result, it will yet not have been quite useless. It has reimposed on investigators obliged habitually to make experimental use of the animal kingdom the duty of earnest self-examination, and has increased their repugnance to all excess over what is imperatively necessary. Presumably, this may here and there have operated beneficially on the habits of daily occupation. For what human occupation could perfectly stand every test? The movement has sharpened the supervision of elders over too zealous youths, made the judgment of professed physiologists stricter in the preliminary consideration of experiments, and put serious dangers in the way of any teacher that in the course of instruction should happen to exceed the necessary sacrifice and provoke the very sensitive criticism of his pupils. Let us be content with these effects, and, above all, trust to the *conscientiousness* that even under Draconian legislation must still always do its best!

regulation, even the prosecution of far more trifling things—of mere pieces of neglect—may seem justified. In Zürich, for example, in the first half of the year 1876, police fines were inflicted in fourteen cases of ill-treatment of animals; and among these fines were one, of five francs, for leaving a cow for eight hours without food or attention and one, of four francs, for leaving two head of cattle for an hour and a half in the open air during a pouring rain (see "Tagblatt der Stadt Zürich" of 28th July 1876).

POSTSCRIPT BY THE TRANSLATOR.

In connection with the second of the British Association resolutions given at page 46, attention may be called to the following passage from page 4 of the memorandum published by professors and other teachers of physiology and mentioned at page 52 :—

"Just as it is acknowledged to be necessary that students of physics or chemistry should learn these sciences by means of experiments, it is as clearly expedient that those who study physiology should enjoy as far as possible similar advantages. These advantages can be attained without infliction of pain. For those great processes of life which ought to be demonstrated to students are physical or chemical processes which are independent of sensation in the subject of experiment, and would, indeed, be interfered with by incomplete anæsthesia. As a matter of fact, the majority of experiments for instruction are made on freshly-killed animals; cold-blooded creatures being available for observations for some hours after death. All others may be performed while the animal is in a state of complete insensibility."

The memorandum is called "Memorandum of Facts and Considerations relating to the 'Cruelty to Animals Bill,' by Teachers of Physiology in England, Scotland, and Ireland," and is signed: "W. Sharpey, M.D., LL.D., F.R.S., Emeritus Professor of Physiology, University College, London; William B. Carpenter, C.B., M.D., LL.D., F.R.S., Formerly Lecturer on Physiology at the London Hospital; G. M. Humphry, M.D., F.R.S., Professor of Anatomy and Physiology, University of Cambridge; W. Rutherford, M.D., F.R.S., Professor of Physiology in the University of Edinburgh; F. W. Parry, M.D., F.R.S., Lecturer on Physiology, Guy's Hospital; M. Foster, M.D., F.R.S., Prælector of Physiology, Trinity College, Cambridge; J. Burdon-Sanderson, M.D., LL.D., F.R.S., Jodrell Professor of Physiology, University College, London; Robert M'Donnell, M.D., F.R.S., Late Lecturer on Physiology, Dublin; Peter Redfern, M.D., Professor of Anatomy and Physiology, Queen's College, Belfast; John Cleland, M.D., F.R.S., Professor of Anatomy and Physiology, Queen's College, Galway; J. J. Charles, M.D., Professor of Anatomy and Physiology, Queen's College, Cork; J. G. M'Kendrick, M.D., F.R.S.E., Lecturer on Physiology, Edinburgh; P. H. Pye-Smith, M.D., Lecturer on Physiology, Guy's Hospital; Gerald F. Yeo, M.D., Professor of Physiology, King's College, London; Charles Yule, M.A., Lecturer on Physiology, Magdalen College, Oxford; Arthur Gamgee, M.D., F.R.S., Brackenbury Professor of Physiology, Owen's College, Manchester."